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The ELECTRICAL REVIEW

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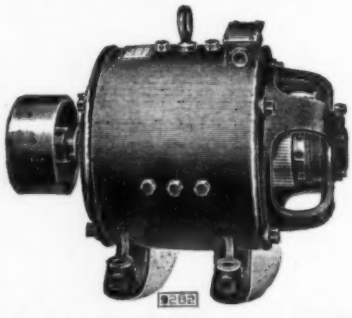

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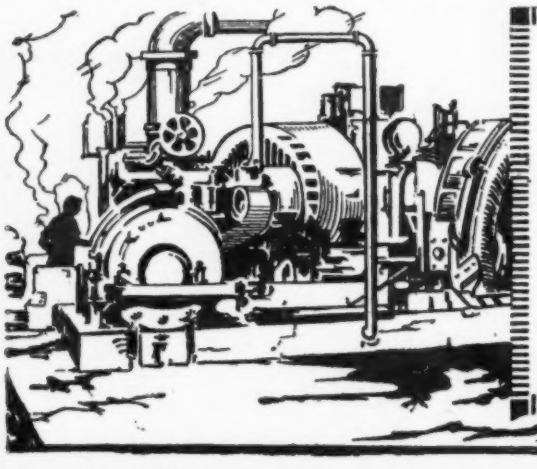

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"The Waste of Capitalism."

THE title above is that of the report of a committee of inquiry into production set up by the National Joint Council representing the Trade Union Congress, the Labour Party Executive, and the Parliamentary Labour Party. It purports to be an unbiased analysis of the causes of low production in industry. The chairman of the Trade Union Congress, Mr. A. A. Purcell, M.P., in a foreword to this report, which we review elsewhere in this issue, says that the searching investigation reveals fundamental defects and deficiencies of the capitalist system of production in spite of the fact that the employers constantly claim that the trouble lies with the workers through industrial disputes, ca' canny, and restrictive regulations. He goes on to say "the normal operation of the capitalist system maintains production at the level at which the highest profits are obtainable by the employers" by limitation of output to maintain profits.

Apparently we are to have at a later date a further report of the steps that should be taken to remedy these defects. We shall be very much surprised if this report is not the prologue to claims for nationalisation. Anyhow, it must be realised that wholesale destructive criticism without due regard to all the facts, from one side about the other, ultimately brings out the worst of human nature, and is a policy that should be abandoned. A statement is made in the report that it is dangerous for either side to try to blame the opposite side for all the causes for a low standard of productive capacity. This is sound, for both sides must take their share of responsibility, and further, it is only by co-operation and honest endeavour on the part of each party to see the other side's point of view, with the object of finding a joint solution of these problems, that the restoration of the industrial welfare of the country can be not only effected but maintained.

The claim for a "voice in the running of industry" by the worker, and the counter-claim of "interference in the management" by the employer, can and must be bridged by compromise to get the best from industry, to the advantage of both, and for the benefit of the community.

The suggestion of the report is "that the only cure is to change the edifice of industry," but it must be realised that you cannot destroy the foundations without causing that edifice to collapse and crush everybody, including Labour. The sound bracing of that edifice to its foundations by co-operation between its essential parts—Capital and Labour—however, makes it better able to withstand an earthquake.

Before this constructive work can proceed, Labour men must be convinced, and capital must assist in convincing them, that their statements in the report are incorrect. For example, their statement that neither employers nor their servants, the managements, are interested in supplying needs, but that their sole interest is making profit, is erroneous. They seem to ignore the great work done by the research and engineer's design departments which is one foundation on which an electrical engineering business is built up, thus providing employment. These men do not work solely to make profit for their employers, but also for the benefit of the community in general. We can assure Labour that the majority of employers in this country do deeply sympathise with the great body of unemployed men, and are making honest attempts to improve industry so that they may again be absorbed. There is certainly no evidence from the past working of Government bodies, such as post office, telephones, arsenals, &c., to show that these are any better managed than the leading industries under the capitalist *regimé*, and there is ample evidence that the development of industries such as our own, the electrical industry, the chemical industry, and our cotton trade, has been due to the enterprise of our present capitalist system.

Further, Labour economists should study the fundamentals of costing before they begin to refer to "minimum costs," for their ignorance on this subject is shown by their statement that "the ideal 'maximum production' is that which is reached when prices cover the minimum cost of production by the most economical methods consistent with the maintenance of a proper and progressive standard of life for the producers." There is one omission in this paragraph, that is, they do not define minimum cost, for this cost is a function of output, and obviously by their statements they do not realise this fundamental fact.

It is interesting to read in the report that no direct evidence of deliberate restriction of output could be discovered by the committee in connection with combines. The reason for this is that combines are doing their best to endeavour to increase output. Many of them at their present output are not fully absorbing their overhead expenses, and are drawing on reserves, and if it were not for these reserves they would probably have to close down. The drawing on these reserves benefits the workers as much as anybody else, since they get their standard wages in spite of the fact that the company is not doing business at a profit.

We notice that the Electric Lamp Manufacturers' Association and the B.E.A.M.A. are mentioned as associations responsible for the limitation of output. Every manufacturer that we know would be only too pleased to be able to get sufficient business to double the size of his factory, but surely regulation of output would be reasonable and legitimate in any business if needed to avoid wasteful over-production, and to secure the best economic results. Further, the State which grants and protects patent rights for the purpose of stimulating invention and progress could hardly require a patentee to give licensees uncontrolled productive rights which might cut the ground from under his own feet.

There are some good points in Chapter 2, which recommends steps being taken to increase production of raw materials for the good of the Empire, such as cotton, which, of course, is an important material in the electrical manufacturing industry.

Many works of our great industries in this country are well equipped and well managed, and in support of this we would refer the committee which issued the report under review to the joint report on Working Hours by a committee consisting of representatives of the Engineering Employers' Federation, the Shipbuilding Employers' Federation, and various Unions. Section 5 of this deals with visits to 12 large works in various parts of England, amongst which the electrical industry is well represented by the B.T.-H., Ferranti, General Electric, Mather & Platt, and the Metropolitan-Vickers companies, and the report agrees that in practically every case the equipment and organisation were excellent. Also under the heading of Welfare, ample evidence is given of the efforts of these firms to make the conditions of employment as good as possible by good lighting, ventilation, washing arrangements, canteens, sports grounds, &c. Why is this report not referred to in any way by the committee whose report is under review?

We are not going to claim for one minute that every factory in this country is as efficient as it could be, but there are many factories that are very much more efficient than is implied in this report, and this particularly applies to the larger firms. In many of the smaller factories it is admitted that the conditions under which labour works are none too good, as mentioned in the leader on the Factories Bill in our issue of October 11th, and it is agreed that steps at the right time should be taken to improve these conditions.

It is interesting to note that this committee favours combinations of works in industry, for it refers to the gain in efficiency by the grouping of railways, the United Steel Combine, and the Baldwin Co., but it is unfortunate that the report should not have concentrated on getting the full advantage of such combinations by co-operation, rather than claiming that one step further might be taken in "nationalisation."

From an outsider's point of view it is obvious that even combines have their limitations (except in the case of highly standardised products), due to the limitations of human nature, *viz.*, the inability of one man to have the time or physical capacity to deal in the most efficient way with the problems that the men at the head of these concerns have to deal with; and further, vested interests do prevent important facts reaching his notice, particularly with regard to workmen in the shops. It is well known how much more seriously this question of vested interest arises in existing Government factories, such as Woolwich Arsenal, &c.

It is interesting to note that the report appreciates the work of a capitalist company, *viz.*, the Horden Collieries, in introducing an electrical installation, and that it supports in every way the electrification of railways.

As for the claim that Labour does not officially restrict output, this is incorrect, for in the 1919 rules of one of the big Trade Unions a distinct embargo is put on piece work, with heavy fines to members who break this rule. Incidentally, the whole of the rules show that the arbitrary control that this union endeavours to put on its members by heavy fines for various offences is so much beyond anything that any employer dare think of, let alone put into effect, that declamations against the arbitrariness of the capitalist employer cannot be put forth in all seriousness. There are 35 fines imposed for various offences, ranging from 3d. to £20.

We can, therefore, only conclude by deprecating such reports as one-sided, and would again urge co-operation in matters of this description, as it is only in this way that any real progress can be made. We look to the Joint Committee on Industry and Trade which is now sitting under the chairmanship of Sir Arthur Balfour for suggestions which will improve trade and, as a result, the position of the workers. We suggest that the proposed remedies that are to be the subject of a further report by the same committee be put before Sir Arthur Balfour's Committee for consideration at once.

Electro-Farming Exhibitions.

At any exhibition of machinery on the Continent nowadays, that has any connection with agriculture, there is sure to be shown a considerable number of electrical appliances. This is natural, because electricity is becoming so important in the daily work of the Continental farmer. In addition to general machinery exhibitions, a new series is commencing entirely devoted to electro-farming. Several of these exhibitions are being held in France this year. The most important, as it is of national rather than local interest, is the Quinzaine d'Electrification Rurale, which will take place at Lyons at the end of this month, lasting until November 2nd. In conjunction with this exhibition a Congress is being held. As the subject is deemed to be of much importance, the Ministers of Agriculture, of Public Works, and of the Interior are supporting it. The farming community, the central station engineers, and the electrical manufacturers are all taking part.

Amongst other subjects that will be discussed is the very interesting one of the practical working of electricity supply, from the economic point of view, in certain districts of France, where the demand is wholly for agricultural purposes. The overhead construction of electrical sub-distribution lines in rural districts is also going to receive attention, including temporary tappings off high-pressure lines.

At the Central Agricultural Machinery Exhibition, which is to be held at the Grand Palais, Paris, at the beginning of January, it is expected that a considerable number of electro-farming applications will be demonstrated.

In England it is very probable that the annual show of the Royal Agricultural Society at Chester, in July next, will afford the British farmer an opportunity of seeing for himself the possibility of using electricity on his own farm. This will be largely due to the enterprise of Mr. S. E. Britton, the energetic city electrical engineer of Chester. The Research Committee of the Royal Agricultural Society is also going to give an official demonstration of Mr. R. Borlase Matthews's method of making hay without sunshine.

Over 175,000 persons have visited the stand arranged by Mr. Matthews for the British Electrical Development Association at Wembley.

It is interesting to note that the Institute of Agricultural Engineering, Oxford, has taken up Mr. Matthews's system of drying hay and corn, and last week carried out demonstrations of the process at the University Farm, Sandford, under the ægis of the Ministry of Agriculture. It is true that no mention was made of Mr. Matthews's prior work in this field, which has been described in our pages on several occasions (first, we believe, in April, 1922), but from the published reports there can be no doubt that the principle is the same.

Taxation and Industry.

Everybody knows that taxation is excessively heavy, and that it is a great handicap to trade. In many businesses all taxation, whether in the form of local rates or of Imperial taxes has to be borne in mind as part of expenditure, and it finds its way into the cost of production and the selling price of an article. The public is called upon to pay more for quite a wide range of products, and its inability to do so leads to a curtailment of purchases, to an indisposition to undertake new production, and to a restriction of enterprise. Industrial organisations and spokesmen have urged the matter upon the Governments and upon the general public repeatedly, and much has been done to reduce unnecessary expenditure. We have reached a point when the question is anxiously asked: "What more can be done?" The limitation of armaments by agreement with other nations and reduction of the National Debt charge have been among the possible courses investigated by the Chancellor of the Exchequer. But Mr. P. Snowden, when appealed to recently by a deputation which presented a petition urging economy and retrenchment, showed, not for the first time since he assumed the office of Chancellor, that the most effective way to achieve economy in national expenditure was for the House of Commons to be made to feel that it was more popular to reduce expenditure than to increase it. At the present time when the nation is once again at the political crossways the Labour Chancellor's reference to the difficulties of his position should be widely circulated. He said that a Chancellor was always being pressed to spend money on some matter which it was thought would bring popularity to its advocates, or in response to some election pledge which had been given recklessly. For eleven months of the year a Chancellor was engaged in fighting demands from the House of Commons for expenditure, and for the other month he was resisting demands for a reduction of the taxation which had been made inevitable by the expenditure which the House had insisted upon. To-day, in the weakness of their flesh, electioneering orators are making promises of all kinds of good things, but future Chancellors, whatever their political shade, will have to ask where the money is to come from. The more heavily we load the back of industry and trade with legislative burdens and with taxation for millennial projects the harder will it be for us to find employment for the army of men and women who to-day have to depend upon the State for maintenance.

The Recovery of Tokio.

No nation without phenomenal fortitude and an inherent vigour could have recovered so quickly as Japan has done from the effects of the terrible earthquake of September, 1923, which destroyed one of her chief ports and the greater part of her capital city and wrought havoc in an extensive area around them, with an appalling loss of human life and material. The area affected is highly-developed and progressive, and the extent to which electricity is used there may well excite the envy of many comparable European states. The bulk of the energy is supplied by the Tokyo Electric Light Co., Ltd., and its associates, and it is perhaps to this centralisation of the business of electricity supply that the rapid recovery of the stricken area may be attributed to a large extent. The principal losses were incurred in the distribution system—sub-stations, lines, and apparatus, which accounted for more than half of the loss of 20 million yen (say, £2,000,000). In spite of this tremendous loss, however, the company is able to report that the effect has been so minimised that it is as if the growth of demand had been held up only for a year.

The Electricians' Wages Demand.

The report of the Tribunal set up to consider evidence with regard to the demand of the power station employés for an all-round advance of 10s. a week, representing three-quarters of a million sterling per annum, is definitely adverse to the claim; it states that the existing rates are above the level corresponding to the increased cost of living, and above the average rates obtaining in the industries using electrical power, but suggests that in certain cases the District Councils should reconsider the rates of pay. The hearing of evidence was reported in our issues of September 19th and 26th. The next step rests with the National Joint Council, which will meet on November 14th to consider the report.

The Tribunal shows that the average net yield of electricity supply undertakings, whether in municipal or company hands, ranges between 3 and 5.3 per cent., and cannot be regarded as extravagant; the extra wages could be met only by imposing extra charges on the consumer, which would have a serious effect on consuming industries and would hamper the progress of the electricity supply industry itself.

In view of these statements, and of the disinclination of the members of the trade unions concerned to embark on a militant policy at present, it is not probable that the peace of the industry will be disturbed.

Electricity Supply in Central Japan.

Progress and Recuperation.

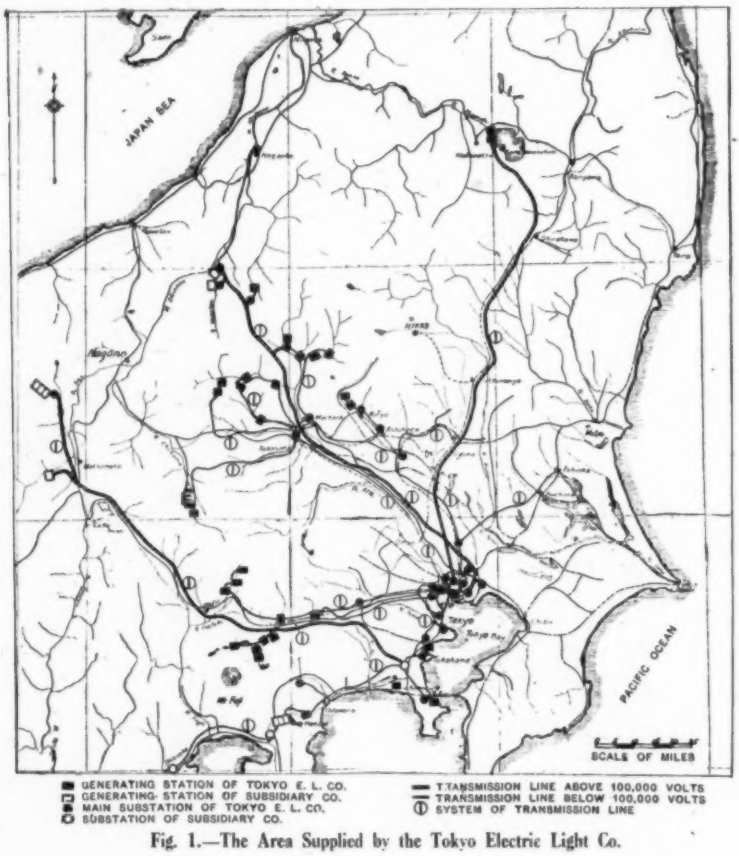
At the seventy-sixth half-yearly meeting of the Tokyo Electric Light Co., held in June last, a report was presented which showed in a striking manner the steady progress of the company during its thirty-eight years of existence and its wonderful recovery from the earthquake which occurred in September, 1923. Commencing in 1886 with a paid-up capital of 120,000 yen, the company made enormous strides, extending its scope and absorbing company after company until in 1923 the paid-up capital had risen to 193,769,880 yen, and the gross earnings, originally 5,743 yen, had increased to over 34 million yen. The company's business district covers twelve prefectures (see accompanying map, fig. 1), and includes the cities of Tokio, Yokohama, Hachioji, Yokosuka, Shidzuoka, Maebashi, Takasaki, Ashikaga, Kiryu, and Nagaoka. In these territories the company provides electric lighting, power, and energy for traction purposes, as well as gas. The total area is nearly 9,000 sq. miles, or about a tenth of the main island of Japan. In 1899 there were 42,233 lamps and 30 kW of other power-consuming devices connected to the company's mains; in 1923 the number of lamps had risen to 4,220,000 and the connected load, apart from lighting, to 272,000 kW. The growth of the load can be seen from fig. 2.

Energy is produced in 32 stations, of which 29 are hydro-electric, and two others are under construction; the total capacity of the plant at these stations is 224,000 kW, and the two new stations will add 75,000 kW to this. In August, 1923, there were 111 substations with practically a million kVA of equipment. The transmission lines had a total length of 1,420 miles, of which 300 miles was operated at 100 kV or above, and only 350 miles was underground. Distribution lines totalled 4,660 miles overhead and 260 miles underground. At the same time, the company operated 49 miles of tramways and employed 8,168 persons.

The earthquake affected the whole of the urban prefecture of Tokio, and the prefecture of Kanagawa, and parts of surrounding prefectures. In all about 6,000 sq. miles of territory was affected to some degree, and 98,408 people were killed and 103,513 injured. About three-fifths of the city of Tokio and the whole of Yokohama were destroyed. About half a million houses were demolished.

With the courage and energy which distinguish the Japanese, immediate steps were made towards the rehabilitation of the desolated districts, with the result that in a few months, at least to all appearances, reconstruction had brought the greater part of the affected area back to its previous condition.

It will be readily seen that an undertaking of the magnitude of the Tokyo Electric Light Co. must have been seriously injured by the earthquake, yet, in spite of that fact, it had to play an important part in the work of restoration. Eleven of the company's power stations, with an aggregate capacity of 109,000 kW, were more or less damaged. The chief injuries were in connection with buildings and power canals. All the machinery practically escaped, though the buildings of some stations were seriously damaged. The transmission system, although affected at many points, re-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MAIN SUBSTATION OF TOKYO E. L. CO.
SUBSTATION OF SUBSIDIARY CO.
TRANSMISSION LINE ABOVE 100,000 VOLTS
TRANSMISSION LINE BELOW 100,000 VOLTS
SYSTEM OF TRANSMISSION LINE

Fig. 1.—The Area Supplied by the Tokyo Electric Light Co.

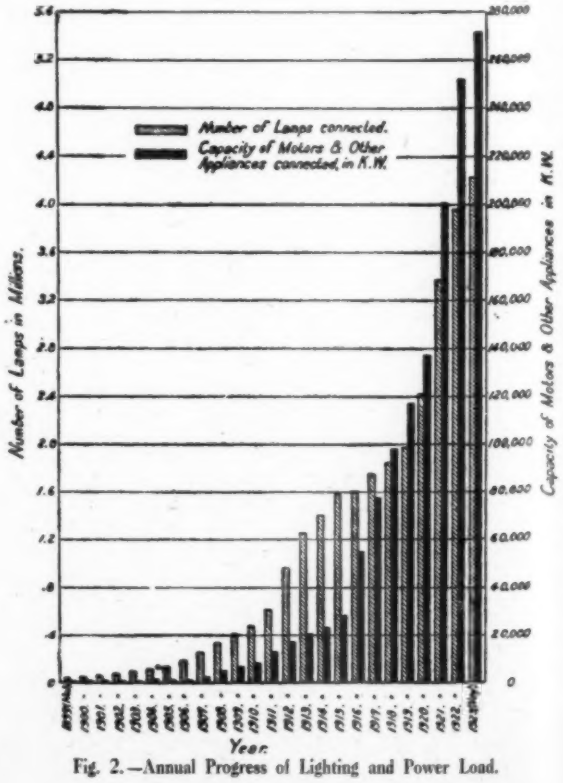

Number of Lamps connected.
Capacity of Motors & Other Appliances connected, in K.W.
Number of Lamps in Millions.
Capacity of Motors & Other Appliances in K.W.
Year.

Fig. 2.—Annual Progress of Lighting and Power Load.

mained, as a whole, in a satisfactory condition. Thirty-seven sub-stations suffered damage, eight were completely burnt up, and the buildings of five others collapsed. The plant damaged represented 43,330 kW out of a total of 220,480 kW. As regards distribution lines, in the Tokio and Yokohama districts 570 miles was disabled, 27,200 poles were burnt, and 10,300 pole transformers were destroyed. A more serious loss was that incurred by both the company and its consumers in the destruction of lighting and power equipment. Over two million lamps were destroyed, and motor and other power equipment aggregating 102,000 kW was lost. The latter belonged principally to consumers. The gas plant and tramway system were not badly damaged. The actual financial loss sustained by the company was over 20 million yen, more than half of which represented the damage caused to distribution lines and apparatus.

The work of recovery was commenced immediately after the earthquake, and within two days the electrical pumping equipment at the Tokio waterworks was put into running order. The next step was the recommencement of the supply to rice mills and newspaper printers, and the restoration of public lighting followed quickly. The house-lighting was attended to; houses with unsafe wiring were cut off and a partial supply given. All members of the company worked hard to clear up the devastated places and repair damaged equipment, and their efforts brought about such a rapid recovery from the effects of the earthquake that at the end of the same year the total actual power output of the company amounted to about the same as it was at the end of the previous year.

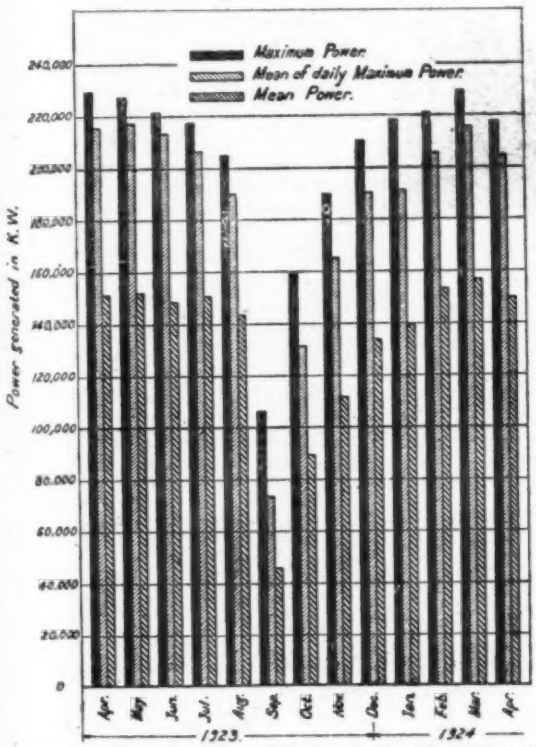


Fig. 3.—Monthly Power Generated from April, 1923, to April, 1924.

The report states the position as it was at the end of May this year. Out of the eleven power stations more or less affected by the upheaval only three were not in operation. Two other stations—Asakusa (old) and Enoshima—were abandoned. Among six operating stations, three were still under partial repair and would be completed, it was said, before the end of the year. All the transmission lines had been re-established, and thirty-one of the damaged sub-stations had been restored and were in operation. The other six were not in operation either because they had to be abandoned or because there was no need of speedy renovation. The distribution system presented the greatest trouble, but at May 31st 460 miles of lines (81 per cent.) had been restored; 21,600 poles (79 per cent.) had been erected; and 6,400 pole transformers (62 per cent.) had been replaced.

A general idea of the company's speedy recovery can be gained from the diagram, fig. 3. This shows that the mean of daily maximum power generated in April, 1923, was 215,400 kW; the figure kept fairly level until August, when it fell to 189,800 kW. In September, the earthquake month, there was a drop to 73,000 kW, but recuperation followed immediately, and the figure rose to 131,000 kW. In January, February, and March, 1924, it exceeded the April, 1923, figure, and in April, 1924, it was slightly above the level of the previous April. To summarise the position, it may be said that the effect of the earthquake was as if the growth of demand had been held up for a year. The report says: "This drawback had only a temporary effect, because the quick-serving characteristics of electricity stimulated and accelerated the use of electricity for not only those who already experienced the benefits of electricity, but others who formerly used steam or other motive power. . . . . Hence we can expect that the increase in the demand for power, in the future, will be much more than it was before the earthquake."

Since the earthquake, reconstruction of the organisation has been proceeding. The company aims at abandoning d.c. distribution; to give an all-day supply of current throughout the whole district; to abolish the simple fixed rate, except for customers having only one or two lamps in one dwelling; to reduce the selling price of light and power; and to provide energy for domestic heating at a low rate. The completion of new stations is being pushed forward to meet the increasing consumption, and additional construction work upon the Inawashiro development is being carried out. The growth of the demand is expected to be greater than the company will be able to cope with itself, and power will have to be purchased from other undertakings.

National Association of Supervising Electricians.—On October 14th the new session was opened with an address by the chairman, Mr. P. M. Hindell, on the work of the Association, after which, in the unavoidable absence of Mr. W. E. Highfield, immediate past-president, Mr. J. S. Highfield spoke briefly on the subject of "Service," pointing out that no one could serve the public efficiently unless he received adequate remuneration for his efforts. The new president, Mr. Frank Gill, M.I.E.E., then delivered his inaugural address, taking the subject of "Economics" as his text, and showing how the value of any commodity depended upon the amount of work that had been done in order to make it available. "Capital" consisted in the accumulation of surplus products—the savings of the community—without which industry could not be carried on; the trade unions of this country had capital worth some 10 millions sterling on deposit with the banks, which was, in fact, invested in industry, and trade unionists were as much interested in promoting the prosperity of industry as any one else. Mr. Gill proceeded to discuss the possibility of reducing the cost of producing manufactured goods by increasing efficiency, eliminating waste, &c., his interesting address being closely followed by a large audience.

Indian Mica.—The high dielectric qualities of Indian mica and the readiness with which it lends itself to splittings give it a predominating place in the world market. *Commerce Reports* says that India furnishes at least one-half of the total world production. Of the mica exported from India in 1913-14 about 57 per cent. went to the United Kingdom, and 19 per cent. to the United States, while in 1922-23 only 29 per cent. went to the United Kingdom and 55 per cent. to the United States. For the five-year period, 1904 to 1908, the number of persons employed in the Indian industry averaged 15,667. In more recent years mica has been mined in the Nellore district of Madras, but the main deposit is in the great Bihar belt in the northern part of the Hazaribagh district, in a strip of country approximately 12 miles broad and from 60 to 70 miles long. The chief mining centre is at Koderma, where very primitive mining methods are employed. Up to the year 1902, some 250 mines had been opened up along this belt. The Indian mica resources are tremendous, and the methods of mining crude and wasteful. Before the war it was stated that fully 90 per cent. of the mica mined was injured or rendered unfit for use.

E

Simplified Automatic Sub-station Equipment.

The Bruce Peebles-Reyrolle Plant.

The design of automatic starting and controlling equipment for motor- and rotary-converter sub-stations affords an excellent opportunity for switchgear manufacturers to exercise their ingenuity, and certainly no lack of ability has been evident in the production of such gear so far installed or exhibited in this country. Ingenuity, however, is apt to run riot when so many conditions have to be fulfilled, and the resultant equipment tends to become more complicated than is strictly compatible with reliability and safety.

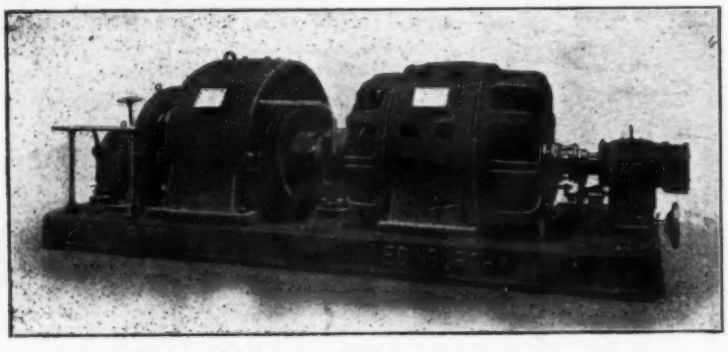


Fig. 1.—A Peebles-la Cour 500-kW Automatic Motor Converter.

While users of such plant have admired the pretty work, they have kept a wary eye on the above-mentioned tendency, and two British firms—Messrs. A. Reyrolle and Co., Ltd., and Messrs. Bruce Peebles & Co., Ltd.—have appreciated the requirements to an extent which has made their typical joint production of "automatic service equipment" exhibited in the Palace of Engineering at the British Empire Exhibition and as installed, with remote control, in the Brighton Corporation electricity undertaking, of outstanding interest. The accompanying illustrations give some idea of the nature of the equipment, but to appreciate its simplicity and the small space it occupies, a personal inspection should be made.

The Wembley equpment is provided with an indicator board and a series of switches to create operating conditions artificially, and enable the visitor to assume the part which the network plays in actual operation.

The converter is a standard 500-kW Peebles-la Cour machine of the self-synchronising type (fig. 1), a choke coil being connected in the usual starting resistance circuit. The only additional feature is a small 3-phase motor for short-circuiting the slip-rings when synchronism is attained. It is shown in fig. 2, and operates the short-circuiting device through a worm gear, being itself energised from a potential transformer in the high-pressure switch panel. The main panel controlling the 3,000-volt, 50-cycle incoming supply from the Exhibition power station is a standard metal-clad panel of the Reyrolle type (fig. 3), equipped with a potential transformer which supplies the operating energy for the automatic feature, and is operated through bevel gearing by a small 3-phase motor mounted upon it. It is fitted with overload protection, and also a low-voltage trip. The automatic controlling devices comprise 14 relays of a simple electromagnetic type in totally-enclosed glass-fronted cases, and a special time-delay device of robust design which may be termed the nerve centre of the equipment. This, together with the time switch, is mounted upon the front of one slate panel, 2 ft. wide by 6 ft. high.

On the centre panel are controls to permit each operation to be performed manually when required, also an ammeter and voltmeter. The third panel is equipped as a standard d.c. machine panel, the main circuit breaker being of the double-pole type arranged for a 3-wire circuit and for either hand or automatic closing. The compactness and simplicity of this portion of the equipment is evident; it is completed by an ordinary starting resistance, fig. 4, a small choke coil, and two simple oil-immersed contactors mounted on the resistance frame, one for synchronising and the other for the insertion of the choking coil. There are also one or two simple oil-immersed switches for controlling the two little auxiliary motors and field discharge.

Fully automatic control includes starting on predetermined conditions, such as a drop in the d.c. busbar voltage, after a predetermined delay controlled by the master time element; the repetition of the starting operation three times, if for some reason the machine fails to go on load at the first attempt, automatically locking out the entire equipment if the third attempt is unsuccessful, and the equipment is also locked out for bearing trouble, or excessive temperature rise in the machine, or an interruption in one phase of the h.p. supply. The machine is automatically shut down after a predetermined number of minutes of underload, and the d.c. circuit breaker is opened on either or both sides of the three-wire system under fault and overload conditions, the d.c. supply being automatically restored after a predetermined number of seconds unless a fault still exists, in which case the machine is locked out and the warning devices are put into commission. All necessary warning signals, both local

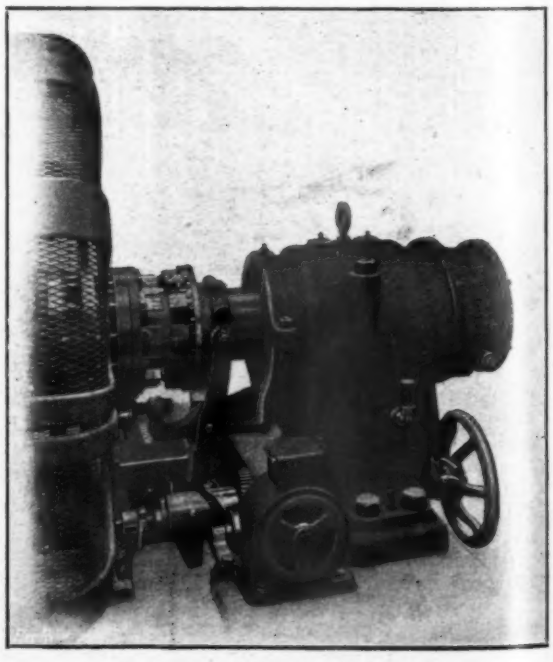


Fig. 2.—Slip-ring Short-Circuiting Device.

and distant, are provided for, and the equipment can be set to come into operation or close down at different predetermined times irrespective of, or in conjunction with, the load conditions. The actual sequence of operation will be appreciated best from the diagram reproduced in fig. 5.

The time delay elements are combined in a multiple relay which consists of a centre spindle driven at a constant speed of approximately three revolutions per minute by a small single-phase motor. This device combines all the time delay elements required in a single case; each mechanism consists of a clutch, by means of which a cam or set of cams is rotated and a series of contacts made or broken in sequence after predetermined intervals of time.

The device embraces a: (1) Starting time element adjustable between 5 and 30 seconds which, when this time is exceeded, continues to function as the "3-time" starting element. (2) Shutting-down element with a similar "3-times" lock-out function which prevents the machine running idle indefinitely. (3) Synchronising time delay element. (4) Overload time element, which is omitted in "lighting" equipment, as the feature is embodied in the standard low-speed circuit breakers; and (5) hand and electric resetting mechanism.

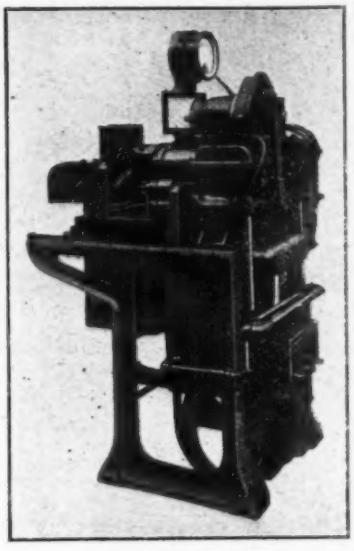


Fig. 3.—Main H.P. Switch Panel.

Fig. 4.—A.C. Starting Resistance.

The circuit breaker shown in fig. 4 is the type adopted for 3-wire networks. For traction work, a Reyrolle reactance type high-speed circuit breaker would be used. The principal features of the high-speed circuit breaker are:—(*a*) The reactance principle is embodied with electromagnetic operation; (*b*) no catches and no tripping mechanism are used; the breaker is entirely electromagnetically operated; (*c*) the combined novel action of low- and high-speed contacts; (*d*) special form of contacts to utilise the effect of magnetic blow-out forces; and (*e*) a free handle.

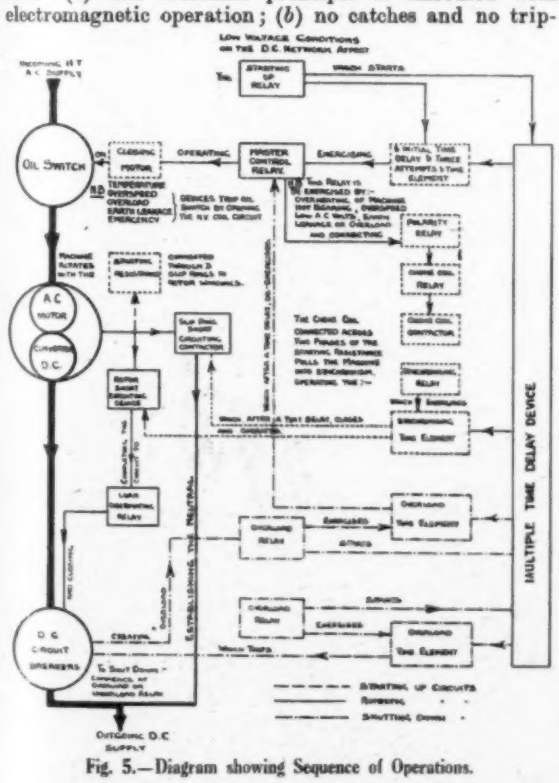


Fig. 5.—Diagram showing Sequence of Operations.

All Peebles-Reyrolle stations are arranged for complete automatic operation; those features which provide a degree of remote operation are in *addition* to the standard equipment. The metal-clad principle is adopted throughout, all live parts are protected, and there is no danger of accidental interference with any of the automatic operations. The motor converter has many features which make it very suitable for automatic operation. It has all the advantages of a low-frequency machine since, generally, it runs at a speed corresponding to half the supply frequency. The reduced number of poles gives an increased brush spacing, and reduces flashover troubles in conjunction with the high-speed circuit breaker. Motor converters operating 3-wire networks balance the supply automatically, and with an out-of-balance current of 25 per cent. of the full-load current, the variation between the two sides will not exceed 1¼ per cent. of the voltage between the outers; with different amounts of out-of-balance current the voltage variation would be in direct proportion to the percentage above mentioned. They are essentially unity or leading power factor machines, and the a.c. brushes are only used during the running-up period in the case of 2-wire plant, and even in the case of 3-wire plant they only carry the out-of-balance current; that is, one-third of the out-of-balance per slip-ring.

There are no polarity troubles, and the standard machine is capable of voltage regulation up to 20 per cent. of normal voltage. There are in successful operation several installations capable of dealing with a voltage range of 40 per cent. without the addition of an induction regulator, booster, or other application.

Incandescent Lamp Anniversary.—*Electrical Merchandising* says that with the American electrical industry celebrating the forty-fifth anniversary of the birth of the incandescent electric lamp, and the annual Electrical Exposition being held in New York, the last week of October will be an important period in local electrical circles. Thomas A. Edison made his first successful incandescent lamp on October 21st, 1879, after months of research and experiment in his laboratory at Menlo Park, N. J., and three years later, September 4th, 1882, electric lighting was introduced commercially in New York. The anniversary of the great inventor's achievement is always observed by the electrical industry, and this being the forty-fifth birthday, special plans are being formulated. Prominent among these plans will be the observance of Edison Lamp Day at the Electrical Exposition in New York. The exposition will be held at the Grand Central Palace from October 15th to 25th, and the 21st will be marked by a number of special features. There will be a historical display showing the development of electric lamps from Edison's first laboratory products to the high-efficiency lamps now in use.

As was shown in the Electrical Review of May 9th, 1924, Sir Joseph W. Swan made the first successful carbon lamp in 1878, about a year before Edison's.

Fuel Economy Research in France.—A new undertaking has lately been formed in Paris, with the support of the French Government, in connection with the economic utilisation and conservation of coal in France. It is known as the Société Nationale de Recherches sur le Traitement des Combustibles, and has a capital of 5 million francs.

The Olympia Motor-car Show.

The Eighteenth International Exhibition.

Regarded as a luxury not so many years ago, the motor-car has to-day become a necessity. It is only natural, therefore, notwithstanding the large area that is devoted to such vehicles in the Palace of Engineering at Wembley, that the show at Olympia attracts all sections of the community to its portals. It is the 18th of the series and the second post-war exhibition to be held under one roof, the Society of Motor Manufacturers and Traders, Ltd., having organised it a month earlier than usual this year in order to give such Colonial visitors as are prolonging their stay in this country an opportunity of seeing the exhibits.

The character of the show has always been international, and the gallery abounds with accessories and "gadgets," where are to be found the exhibits of an electrical nature, chiefly electric lighting, engine-starting, and ignition apparatus. One vehicle has a "magnetic" transmission system, but no radical changes are apparent, development during the year having consisted apparently of the perfecting of detail.

Consideration of the average electrical equipment fitted in a motor-car will show that it is larger, more expensive, and heavier than need be. The reason for this extraordinary state of affairs, as was pointed out by Mr. D. P. Dunne at the Exide luncheon on private view day, is that the car maker cannot reconcile himself to the idea of buying the starter and battery separately, because he desires to place undivided responsibility on the equipment maker, a fetish that exists only in this country. The battery is a vital part of the car and has to be renewed from time to time; why then not make it as efficient as possible, thus reducing this recurring expense to the lowest figure compatible with good service? At present many car builders resign themselves to the hands of the starter maker and the battery is a sort of side line. The innate conservatism of the Britisher makes him slow in appreciating the wisdom and economy of purchasing the electrical equipment in its component parts.

B.T.-H. Magnetos.

The British Thomson-Houston Co., Ltd., has a range of magnetos on view; they are manufactured in four types, one of which is the polar induction machine, fig. 1, of a new design incorporating a rotary magnetic field and stationary armature. This type is claimed to have advantages over the rotating-armature type, a feature being the fact that it can be run at a reduced speed, giving four sparks per revolution.

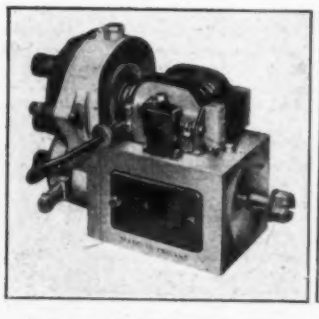


Fig. 1.—B.T.-H. Polar Induction Magneto (Cover Removed).

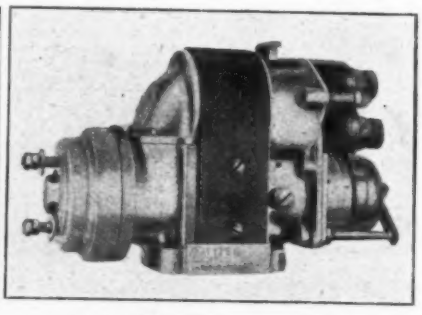


Fig. 2.—Rotating Armature Magneto with Impulse Starter.

The "AV" has a tungsten-steel magnet instead of the cobalt-steel used in the type "CE." The components are grouped into a few accessible sub-assemblies to facilitate dismantling, no special tools being required. The inductors are pressed on and then secured to a straight-through nickel-steel shaft by means of rivets. It is possible to remove the armature core without affecting the flux in the slightest degree; this is a distinct advantage, since the armature can be removed and replaced without the necessity for re-magnetising. The armature is stationary, is provided with a laminated core, and is mounted on the laminated armature poles above the main body casting, out of reach of oil and grease. In the condenser no rivets are used and the whole armature and condenser assembly can be removed from the armature poles by simply slackening and throwing back two securing clamps, and the distributor gear wheels, spindle, bearing, and brush holder are assembled as a single unit. Integral with the bearing is an oil reservoir, lubrication being by a wick and ducts.

In magnetos with impulse starters as integral parts, fig. 2, the arrangement comprises a stout helical spring connecting the driving and magneto spindles and a pawl and stop, so that on turning the starting handle rotation of the magneto armature is temporarily arrested for a pre-determined period and then it suddenly flicks over, producing an intense spark.

Automatic ignition-timing gear comprises centrifugally-operated mechanism which automatically advances the timing of the magneto relative to the engine and at a rate pre-determined in accordance with the requirements of any car.

Fabroil silent timing gears possess qualities which make for noiseless running. The gear wheels are pressed into shape hydraulically, and consist of layers of fabric banded together with an insoluble and infusible synthetic resin. The comparatively thin web allows a certain amount of flexibility for absorbing shock and vibration.

Other Magnetos.

Other stands on which magnetos and spare parts are to be seen are those of Messrs. North & Sons, Ltd., the Société Anonyme pour l'Equipement Electrique des Vehicules, Marelli Magnetos (England), Ltd., Fellows Magneto Co., Ltd., the M-L Magneto Syndicate, Ltd., and the B.I.I.C. Co., Ltd.

The "Magnetic" Car.

A 20/50-h.p. 6-cylinder chassis is exhibited by the Magnetic Car Co., Ltd., the engine having a 73-mm. bore by 115-mm. stroke (Treasury rating 19.8 h.p.), overhead valves, pump water circulation, and forced feed lubrication of all bearings, including the valve rockers. Magneto ignition is provided and the lighting and starting are effected through the transmission system, which is of the "magnetic" type, giving a very large range of variable speeds and eliminating gears and the clutch. The final drive is by means of an enclosed torque tube and spiral bevels.

The Sparkophone.

Messrs. Simms Motor Units (1920), Ltd., in addition to magnetos, sparking plugs, and "magnetic-electric" speedometers, are showing also the "Hiwaylite" lighting set, which requires no accumulators, and the "Sparkophone" apparatus for testing sparking plugs. The device is similar to a telephone earpiece, and it indicates not only whether the plug is "shorted" or not, but also if the spark is weak the note transmitted is correspondingly weak. The device is neat and extremely simple.

Accumulators and Batteries.

Accumulators are to be seen on the stands of several manufacturers, such as the C.A.V., Miller, Ripaults "Dinin," and the French S.E.V. The Chloride Electrical Storage Co., Ltd., makes nothing but batteries, and it naturally follows that batteries only are shown on the stand, but they vary in types and sizes from the tiny cell for policemen's handlamps up to large starter batteries for the heaviest cars. Features worthy of inspection are a new battery for Morris cars, having an abnormal cranking capacity for its size, and a battery taken from one of the first Cadillac cars equipped with electric starting, lighting, and ignition, which has been in continuous use in this country for over 12 years. To those interested as much in what a battery is as in what it does, component parts in various stages of construction are available for study.

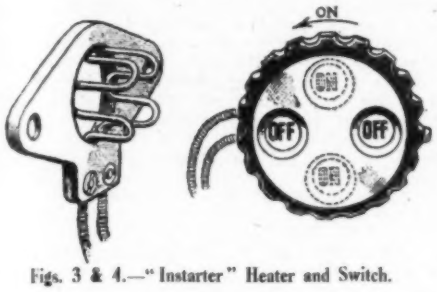
Batteries, component parts, &c., also form the display of Messrs. Peto & Radford (proprietors: Pritchett & Gold and E.P.S. Co., Ltd.).

"Gemmy" Carburettor Flooder.

Messrs. Johnson, Neal & Co., Ltd., have on view an electro-magnetic device for fitting to all standard types of carburettors which enables them to be flooded from the dash, obviating the necessity of raising the bonnet for this purpose; the operation is carried out by merely pressing a switch on the dashboard.

The Instarter.

Messrs. E. D. Motors, Ltd., are showing an electric heater, devoid of complication and easily fitted, designed to go inside the induction pipe of any car engine to assist starting in cold weather and ensure slow running without misfiring. It consists of a fibre flange for insertion between the induction pipe or carburettor and the cylinder casting, which acts as a support for a thin copper tube bent into loops, fig. 3, inside which is an insulated wire, which is led out to a switch on the dashboard, being connected with the lighting and starting accumulators. The insulated wire forms the heating element of the device, its heat being transmitted to the copper tube, and thence either to the cylinder casting or to the induction pipe,



Figs. 3 & 4.—"Instarter" Heater and Switch.

according to whether the looped tubes are inserted within the opening of the former or of the latter. In addition it also heats the ingoing mixture. Two forms of switch are available, one of the simple tumbler variety, and the other of the pattern shown in fig. 4. The heating element can be arranged for use with either six- or twelve-volt accumulators, the current consumption in the former case being 4½, and in the latter 3 amperes. It is to be noted that contact between the looped copper tube and the metal of the induction pipe or cylinder casting cannot produce short circuits, since the heating element is insulated from the containing tube.

Sparking Plugs.

Sparking plugs of various types are exhibited by Lodge Plugs, Ltd., and the A.C. Sphinx Sparking Plug Co., Ltd., Fordward Sparking Plug Co., Ltd., Champion Spark Plug Co. of Canada, Ltd., and the Robinhood Engineering Works, Ltd.

Lighting and Starting Sets.

Messrs. C. A. Vandervell & Co., Ltd., amongst other productions, display lighting dynamos with standard and special provisions for incorporation with engine designs, including coil-ignition attachments; also combined dynamo-starters, starter motors with proprietary drives and fixings with special pinion engagement controls. Switchboard controls of flush fitting design, road lamps with special mountings, detachable fronts, concealed wiring and quick focus features, including diffuser glasses and universal swivel fixings; standard and beam-deflector twin-filament headlight bulbs for night driving, also simple dimmer switches without resistances are shown, together with accessories, spotlights, and dashboard searchlights.

Amongst other manufacturers of similar equipment may be mentioned Messrs. H. Miller & Co., Ltd., Powell & Hanmer, Ltd., the Lucas Electrical Co., Ltd., Rotax (Motor Accessories), Ltd., the Société Anonyme pour l'Equipement Electrique des Vehicules, Marelli Magnetos (England), Ltd., Delco-Remy, Ltd., the Midgley Car Lighting Co., Ltd., and the British Lighting and Ignition Co., Ltd.

Electric Windshield Cleaners.

Two electrically-driven windscreen cleaners are shown; one on the stand of the Cooper-Stewart Engineering Co., Ltd., which firm also shows electric (start-stop) rear warning signal lamps, and the other on the stand of Klaxon, Ltd., the well-known electric horn makers. The device is driven by a tiny motor not much more than 3 in. long, which is attached to the windscreen. A solenoid-operated wiper is shown by Fluid Pressure Pumps, Ltd.

Cables for Cars.

Electric cables for use on motor-cars, including armoured and wire braided patterns, are shown by Messrs. E. Kalker and Co., Ripaults, Ltd., and the Dominion Rubber Co., Ltd. Such things as copper and brass tags for electrical connections, "Spearcentric" terminals for magneto cables, "Facile" wiring terminals, and the "Nount" intercoil connection, are shown by Messrs. Ross, Courtney & Co., Ltd.

Accessories and Tools.

In addition, agents and other firms show lamps, electric horns, &c., and garage equipment. Messrs. Mann, Egerton and Co., Ltd., show a portable air compressor, while John Shaw & Sons, Wolverhampton, Ltd., exhibit "Thor" electric tools for drilling, reaming, grinding, &c., as do also Messrs. Gerrard & Co., Ltd. Electric air compressors are shown by Sir W. H. Bailey & Co., Ltd., and magnetic chucks and the Van Dorn electric drill by Messrs. Alfred Herbert, Ltd.

Reviews.

The Waste of Capitalism. Report of the Committee of Inquiry into Production, &c., set up by the National Joint Council representing the Trade Union Congress General Council, the Labour Party Executive Committee, and the Parliamentary Labour Party. London: Labour Joint Publications Dept. Price 1s. 6d.

In reading this publication one soon realises that the report is largely political propaganda against the "capitalist" order of industry, and this makes it very difficult to gauge its true value, especially as, although the whole atmosphere of the book is nationalisation, there is no definite scheme to criticise. We gather from the last paragraph of the foreword by Mr. Purcell, Chairman of the Trade Union Congress, that a further report is to be presented giving "a positive solution of the evils disclosed in the present analysis." The outstanding features of the report are the lack of the spirit to co-operate in the improvement of the shortcomings in the existing conditions, and the suggested substitution of nationalisation for the present "capitalist" system of industry. This is clearly stated in the foreword by Mr. Purcell: "the existing order in industry cannot 'deliver the goods,' and reorganisation and a new form of control have become necessary."

The book when read carefully is found to be very contradictory; for instance, in one place a general condemnation is made of "capitalist" methods in forming associations, but later on combines, such as the grouping of the railways, the United Steel Company and Baldwin's, are commended for the steps they have taken. We will proceed to analyse the report briefly:—

Chapter I gives the terms of reference of the Committee's work. These should be carefully studied. On page 6 the admission is made that it is "an unquestioned fact that the output per employé showed a decline on the pre-war average" and it is agreed that contributory to this is the reaction from the stress and strain of war conditions, including the loss of skilled workers, a larger than normal proportion of young and untrained workers, and the change-over from war production, and that it is not the effect of "capitalist" organisation.

Chapter II. Raw Materials.—In many respects the comments are very sound, especially the recommendation for the development of the production of raw materials, including cotton, within our Empire, and the encouragement of research. In connection with the national control of supplies reference is made to the Government's stabilisation of prices of certain raw materials during the war, but although one would not criticise the procedure as a "war" contingency, it cannot be claimed altogether as an economic success, as has been shown by the various returns of Government trading published since.

Chapter III. Restriction of Output and Minimum Cost.—Deliberate restriction of output by employers in order to maintain prices and profit is alleged, but no real evidence is given in support of the claim. Reference to minimum cost is frequently made in this chapter, but no indication as to what is meant by minimum cost is given, nor apparently does the Committee understand that increased output means a decreased cost. Price- and output-controlling associations are not looked at from the broadest point of view, namely, that their sole object is not to make huge profits or control output but to improve the industry generally, in which, of course, Labour must benefit. No evidence is given, for instance, of excess profits in the electrical industry being earned over the last 20 years, and further, no reference is made to the large sums of money which have been lost in the development of our industry. It might be suggested that "people who live in glass houses should not throw stones," for surely the organisations of unions in this country are associations for controlling prices and output. In support of this it might be mentioned that the 1919 Rules of one large union disclose that members are liable to 35 fines (ranging from 3d. to £20) for various offences, including one for being associated with or encouraging the introduction of piecework. The report does not draw attention to the fact that associations of manufacturers and unions, if properly controlled and subject to the right safeguards of the public, can be of great value in the development of industry. Extreme action by either can be equally disastrous.

Chapter IV. Defective and Out-of-date Machinery.—This chapter loses much of its value owing to the atmosphere in which it is written. No employer in his right mind would argue against a shop of good lay-out, good machinery, and sound organisation, although all employers may not agree with the detailed application of the last item, since it is largely a matter of opinion. It is interesting to note that no reference is made in this chapter to the Report of the Joint Investigation Committee on Working Hours appointed by the Engineering and Shipbuilding Employers' Associations and the Unions' Negotiating Committee, on Working Hours, on which Mr. Brownlie served and was a joint chairman. In this report both sides agreed that of twelve works visited in this country, including some of the leading electrical manufacturers, the B.T.H. Co., Ferranti, General Electric Co., Mather & Platt, and Metropolitan-Vickers, their lay-outs and organisations were

excellent. Why was reference to this report omitted? On page 38 the admission is made that the installation of labour-saving machinery is an obvious necessity, and we trust that employers will always get the support of labour in this, for it has not always been so, as is admitted elsewhere in the report.

The use of electricity in mines and the sections on pages 47 and 49 regarding power supply are of great interest, particularly that at the foot of page 50, which rather offsets the arguments for either nationalisation or municipalisation, for the electricity supply of the North-East Coast, which is run by a company, is quoted as one of the systems supplying the cheapest power. There may be many arguments which can be put forward for dealing with power supply on a national basis, but there is a big difference between a public service and industry competing in the world's markets. There is no evidence at present available to show that even the best municipally owned power services are more efficiently managed than the best companies.

No reference is made to the effect of high national and municipal taxation in delaying the revival of trade. Some portion of this taxation is due to inefficient management of affairs.

There is a good deal of truth in the references on page 52 to agriculture, although efforts are made to create an atmosphere instead of getting the best out of the evidence.

Chapter V. Strikes and Lockouts.—This needs no special comment, except to say that it is very difficult from the official figures to gauge the whole effect of a strike. The figures given are those directly affected by a strike, whereas the number indirectly affected may be a great deal larger; for instance, the strike of the iron foundry people in 1920, representing not more than a quarter of those in the industry, practically shut down the whole of the engineering industry and many other industries.

Chapter VI. Long and Improper Distribution of Hours.—This need not be taken too seriously, as, after all, most workers in this country do not work more than 47½ hours per week at the present time.

Chapter VII. Unsatisfactory Conditions of Lighting, Ventilation, Cleanliness, Sanitation.—It will be agreed that where these are not satisfactory they must have attention. It is not fair to claim that the majority of factories are working under these unsatisfactory conditions. The position is certainly otherwise, and even nationalisation would not be able to rectify the defects immediately.

Chapter VIII. Opposition to New Machinery and Insecurity of Workers.—It will be agreed that insecurity does seriously affect production, and nobody realises this more than the employers, who are striving, we believe, to take steps to improve this by increasing trade. It is also agreed that it may be difficult for the worker to accept the argument put forward by the employer (which is none the less true), namely, that increased efficiency in plant, although meaning reduction of employés at the time it is installed, will mean ultimate increase in employment due to the fact that lower prices can be put forward.

Chapter IX. Lack of Responsibility of Worker.—The statement on page 102 that "the average employé to-day has little or no interest in his work or in producing maximum output, partly because the work itself is so often uninteresting drudgery . . . all in order to make profits for someone else" certainly does not apply to the majority of workers. Further, no reference is made to the various profit-sharing schemes which are running successfully in this country, and which, no doubt, help to encourage the worker. Perhaps the reason this reference is omitted is the well-known fact that Labour generally is inclined to oppose these proposals, largely because it would put the employer in a stronger position.

Chapter X. The Effects on Output of the Trade Cycle and the Limited Market.—On page 109 the statement is made: "It is not proposed to embark on a full discussion of the possible causes or cure of a trade cycle." It seems to us that this comes within the terms of reference, and if the Committee does not wish to discuss it, why refer to it at all in the report?

Conclusions.—On page 113 is given the summing-up of the Committee. Amongst the sources of waste and inefficiency are the following, and we suggest that these should be given consideration by both employer and worker:—

Insecurity of workers and periods of unemployment.

The effects of a trade cycle.

The failure to replace defective and out-of-date plant and equipment.

Lack of co-ordination between industries, and parts of industries.

The need of improvement of works organisation and the transport system.

Other causes are mentioned, such as workers' lack of status, absence of incentive to work for profit-making industry, restriction of output by employers (which does not exist), long hours, low wages, and unhealthy conditions; but, as referred to previously, they are of little moment.

All those responsible for the control of labour, from director down to foreman, would be well advised to read and thoroughly realise, from an unbiased standpoint, the extremist's point of view, and should not wholly condemn it, but, where they feel the weaknesses referred to in the report apply to themselves, take steps to remedy them as early as practicable. In this way some good can accrue from the report.

The Engineers' Year Book for 1924. Edited by H. R. Kempe, M.Inst.C.E., and W. H. Smith, F.R.S.E. Pp. lxxxvii+2,868; fully illustrated. London: Crosby Lockwood & Son. Price 30s. net.

The growth of this encyclopædic handbook appears to be asymptotic, only about 100 pp. having been added in the current issue; eventually, perhaps, it will approach a permanent value of 3,000 pages—surely the utmost limit for a single volume! The editors' difficulty is obvious—new material cries out for admission, but where the contents are so good, what can be cut out? Excision is a hateful task.

The sections on Electric Traction and Electrical Engineering in this edition have been extensively revised and amplified by Prof. S. Parker Smith, D.Sc., M.I.E.E., in whose hands they are certain to be reliable and up-to-date, more especially in view of the fact that Dr. Smith has made a close study of the problems of railway electrification and the design of electrical machinery. Hence, there is a large amount of new matter in the former section, showing the present state of progress in various countries and the systems in use, and the rest of the text has been carefully revised.

In the Electrical Engineering Section the changes are not so noticeable in bulk, but a close comparison with last year's issue reveals numerous instances where alterations and improvements have been effected, indicating that the whole of the matter has been carefully revised and weighed, and may therefore be consulted with confidence by the user. For the rest of the book we can only say, as before, that it is an inexhaustible mine of information on almost every subject connected with engineering.

A Two-Valve and Crystal Reflex Receiver. By W. James. Pp. 6. Six illustrated sheets. London: The Wireless Press, Ltd. Price 2s. net.

This booklet gives full consfructional details of a two-valve and crystal reflex receiver with reaction on the aerial tuner. Mr. James has written extensively on constructional work for amateur experimenters, and knows well what sort of instructions are required.

The receiver described will tune to waves between 300 and 700 metres, and can be easily adapted to tune to the 1,600-metre wave of the British Broadcasting Co.'s new high-power station.

The circuit is a good one, but apt to be a little tricky unless well designed. If the components recommended are used and the instructions carefully followed, one should obtain good loud-speaker reception from a British Broadcasting Co.'s station up to 50 miles if an outdoor aerial is used, and up to about 25 miles with an indoor aerial.

The receiver is economical in first cost and maintenance, and has been thoroughly tried out in practice by a number of experimenters, one of whom, the author states, was able to receive on it a concert broadcast from an American station.

A Three-Valve Portable Receiver. By Hugh S. Pocock. Pp. 8. Nine plates and illustrated sheets. London: The Wireless Press, Ltd. Price 2s. net.

The author is the editor of the journal, *The Wireless World and Radio Review*, and this book is the first of a series entitled "The W.P. Ezi-Wiring Series."

The book contains clear instructions and working drawings for the construction of a three-valve broadcast receiver fitted up in a suit case. The set described, when used with an outside aerial, should be able to receive at least one of the broadcast stations when used in any part of the country, and if fitted instead with a frame aerial inside the lid of the case it should be able to receive up to about seven miles from one of the stations.

The approximate cost of the various components is of interest to most amateurs, and might perhaps have been included.

During the holiday season this year portable receivers have been very popular, and this little book should be most useful to anyone wishing to put together a three-valve set in a compact and simple form.

"Nife" Batteries on Mount Everest.—We are informed by Messrs. Batteries, Ltd., of Redditch, that for operating the Newman-Sinclair "Cine" cameras on the recent Mount Everest expedition, "Nife" batteries, consisting of seven cells (type AO4) of 4-amp.-hours capacity were employed; for other purposes, the expedition used a 12-volt battery of 60 amp.-hours. The batteries were transported across Tibet on mules, encountering a great deal of rough usage and being often upside down. During the whole of the period of the expedition the only attention they received was the changing of the rubber corks twice, the addition of a little water (melted snow) and the cleaning of the terminals. Each battery was used for driving the camera for about two hours, and despite this, registered full voltage six months after the original charge. Throughout the batteries worked perfectly in intense cold at the great altitudes to which the climbing parties went, and successfully withstood the rough treatment they received during mule transport on both outward and return journeys through Tibet.

Glover's Surface House-Wiring System.

A New Competitive System.

METHODS of house wiring involving the use of vulcanised rubber-covered cable sheathed with a lead alloy and special bonding devices are becoming increasingly popular. Several such systems are already available, and the introduction of a new one by MESSRS. W. T. GLOVER & CO., LTD., suggests a departure from the commonplace. This expectation is fulfilled, for the system possesses new and interesting features.

The cable itself follows standard lines, being made to C.M.A. size in single, twin flat and 3-core flat. For fixing it, the familiar buckle clips are recommended; they are neat in appearance, and the screw or fixing-pin holes are countersunk in order to minimise the possibility of projecting heads damaging the cable sheath.

The particular features of the new system, for the design of which we understand Mr. F. C. Raphael, M.I.E.E., has to a large extent been responsible, are labour saving by the elimination of wood blocks and the method of bonding at

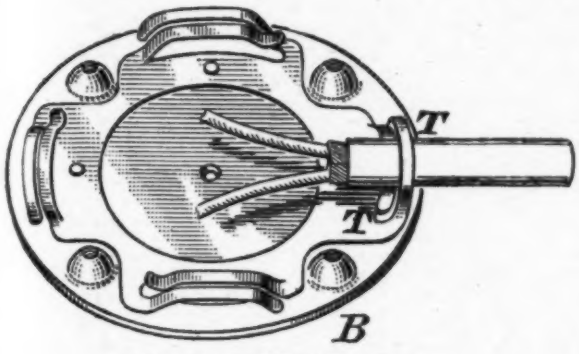


Fig. 1.—Universal Backplate.

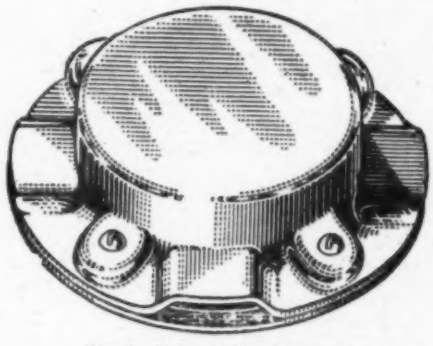


Fig. 2.—Universal Junction Box Cover.

fittings and junction boxes, which is done without the use of any loose parts or special tools, and virtually automatically by the insertion of the cable. All the fittings are substantial steel stampings with a standard finish of Florentine bronze lacquer.

The method of bonding is made clear by the illustrations of the universal backplate (fig. 1) and junction box cover (fig. 2). On to the backplate a tinned-brass bonding ring is riveted, and at every point of entry there are a pair of projecting flat springs of a special shape T, between which the cable is placed. On screwing down the cover the upper spring is pressed tightly against the cable and follows its

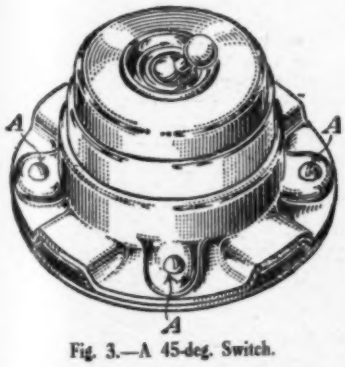


Fig. 3.—A 45-deg. Switch.

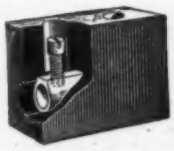


Fig. 4.—One-way Moulded Connector.

shape, whereas the lower spring maintains a constant tension, so that good contact is always maintained. This solves the problem of maintaining permanent contact with a soft metal like lead without soldering. Where the backplate is tapped for the reception of the holding-down screws, the metal is raised as at B to enable screws of a good length to be employed and thus facilitate assembly. The cover is raised at four places (A, fig. 3) to correspond, and accordingly goes down automatically into the correct position, there being no waste of time in getting the clearance hole of the cover and the tapped hole of the backplate to register.

The junction box backplate is fixed to the wall by one countersunk screw, but for the fitting backplates, which are otherwise exactly similar, three screw holes are employed. In place of ceiling roses, boxes similar to junction boxes are employed, with a well-made cord grip projecting from the centre; or in the case of ceiling lamp-holders, the lamp-holder is riveted to the box instead of the cord grip. All loop connections are placed in the box, but there is no need to make them after the box has been fixed to the ceiling, an awkward position for the workman. The backplate can first be fixed to the ceiling with the cable in any convenient position; then all connections can be made, and the flex fitted in the cord grip, after which the cover is placed over the backplate and simply screwed on.

A very similar arrangement is followed in the case of wall plug sockets and switches, and here also the saving in labour in erection is marked. The switch is sent out permanently fixed to the junction box cover, with bushed holes for the passage of the wires to the ordinary pillar terminals of the switch. All that it is necessary to do in erection, therefore, is to fix the backplate to the wall, connect the wires in the switch (which can be done away from the wall), place the cable between the bonding ring tongues, and then screw the cover on to the backplate. The projection of the box on which the switch is mounted is no greater than that of an ordinary wood block, and in the case of a switch to be fitted near to a door frame, when the cable has to be bent at an angle to the vertical to enable it to enter the box, a 45 deg. switch (fig. 3) should be used. The simple fixing arrangements make it not unreasonable to expect a saving of from 10 to 15 minutes in the erection of each switch on the Glover system, and even greater saving of time in the fixing of "pendant boxes," as compared with the use of blocks and ceiling roses. A further advantage is that slack cable can be left inside the box, and there is ample room for connectors for looping. The range of accessories includes also flange holders and wall sockets fixed direct to the boxes.

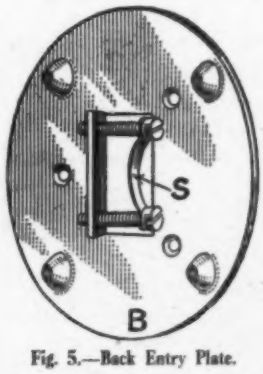


Fig. 5.—Back Entry Plate.

Another feature of the new system is the connector which takes the place of the hitherto necessary, but much abused, porcelain connector. The brass tube, instead of being loose as in the porcelain connector, is firmly moulded in a strong insulating composition (fig. 4), and the construction is such that the head of the screw cannot project beyond the insulation; it is impossible, therefore, for it to cause an "earth" by coming into contact with the box. The range of fittings includes an alternative form of backplate for back entry (fig. 5), which will effectively bond any number up to four twin cables with the spring S; it is particularly intended for use with pendants when the wiring is placed between the floor and ceiling.

No special tools are required for erection, and only two sizes of screws and Rawlplugs are needed, while a useful feature of the catalogue descriptive of the new system is the inclusion of a number of diagrams which, with explanatory notes, will enable wiring circuits to be easily and quickly planned. Glover's wiring system appears to present a sufficient number of new features to warrant some revision of ideas as to the number of points that can be wired per man per day. Its erection is simplicity itself and, in addition, inspection is greatly facilitated, for (except in the case of the back entry fittings) all bonding is on the surface and visible.

Electricity in Party Programmes.

In the Electrical Review for July 18th, 1924, p. 95, we dealt fully with the pamphlet issued by the London Labour Party Executive on electricity supply, and in our leading article of that date the "Coal and Power" report prepared by Mr. Lloyd George's committee was reviewed. On August 8th we summarised and commented editorially (p. 201) upon the lengthy speech delivered by Mr. Snowden in the House of Commons on the Labour Government's electrical policy.

We give these references now for the assistance of readers who may be following the speeches which orators of all three parties are delivering to the electorate at the present time. When the programmes of the three parties were published in the Press last week it was stated that the Liberal Party had a policy which was set forth in the Lloyd George "Coal and Power" pamphlet; that the Labour Party stood for national ownership of mines, railways and canals, and of electricity supply; but that the Conservatives had no electrical policy.

It was stated in *The Times* of October 15th, however, that in a letter to Sir Alexander Kennedy, Mr. Baldwin had written that the question of the development and supply of electric power had for some time been under the consideration of a committee set up by him, and that the vague proposals put forward by the Labour and Liberal Parties showed no evidence of that careful scientific exploration which so technical a subject demanded.

Mr. Baldwin's Speech.

On the same day Mr. Baldwin referred more fully to the subject in his speech at the Queen's Hall. We quote some extracts from *The Times* report:—

"The Socialists are indeed the cheap-jacks of politics, and have a lot of surprises up their sleeves, schemes which will turn the world upside down. To read their manifesto you would imagine that they were the discoverers of electricity, that they had inaugurated the railway system, and that no one but themselves knew how to manage a coal-mine."

"I myself, as one who has had some experience of business and industry, lament this tendency of political parties to exploit such subjects as electricity and the management of great industries such as coal and railways. The ignorance of the public is almost as great as the ignorance of those who advocate their panaceas. Having regard to this, I have been at some pains to approach the subject in the only way in which it can be approached with any prospect of success. I have formed a committee of practical men, who are not politicians, to advise me with regard to the whole subject of electrical power, and I shall await whatever I may receive from them before I commit myself to any vague promises as to what may be done in this country in regard to electrical development."

"But I would say this as a word of warning to many of those who use the word electricity as they would Mesopotamia, as having a comfortable sound, that it is misleading and deceiving the people of this country to point to what can be done in many a foreign country and to take that as our guide at home. We have no advantages here in the way of water power as they have in Switzerland and in Italy and in Norway for the production of cheap power, and it is indeed a cruel fraud on the people of this country to make them believe that there can be brought to their rescue in a time of great unemployment powers of nature which here have no existence. No, believe me, the true function of government is to encourage in this country individual effort, to protect the consumer, to secure co-operation wherever possible, and to aid liberally scientific research whether by private individuals, by research societies, or by universities."

"There is not one of you but must have noticed the opposition given by many members of the Labour Party to private Bills dealing with electrical schemes in the House of Commons this summer. I cannot imagine any conduct more callous to the hosts of unemployed than that, and the only excuse that there can be offered, not always avowed wholeheartedly, is that, by helping to strangle and kill private enterprise, they might hasten the day for nationalisation and public ownership. Nothing more shortsighted can you imagine. Nothing more futile and nothing, I may add at this moment, more cruel, because, apart from the delay caused in obtaining employment by the blocking or rejection of private Bills of that kind, we cannot forget that the more the extreme wing of the Labour Party shows its inclination and its desire to cripple private enterprise, the more will those who have the control of industrial capital tend to keep their capital from industry until such times as they can be assured that it will have fair play."

The Labour Party.

It may be of interest to place on record the fact that at the annual conference of the Labour Party on the day that saw the defeat of the Government, Mr. Herbert Morrison, M.P., moved a resolution with regard to the provision of cheap electric power for transport, industrial, agricultural, and household purposes, insisting that the Government should take the earliest opportunity to introduce and pass a general measure laying down the lines of a comprehensive national system, based on public ownership and control, and that in the meantime no private electricity Bill should receive Government sanction or support. *The Times* reported the speech as follows:—

"The questions of our coal resources and the future of electricity supply were of the greatest importance to British industry and to the people. In the House of Commons Labour members had been active in resisting private companies' Bills. The tendency of electricity legislation had been to develop in the country a hotch-potch of electricity supply undertakings. Labour members of Parliament had made up their minds that no more private electricity Bills would go through the House of Commons with their consent. It was in the interests of the country that the electricity supply industry should be co-ordinated on a national basis. All electrical generation, whether for railways, tramways, industrial, lighting, or for domestic purposes, should be under one control. They wanted cheap electricity to lighten the toil of the women in their homes. They wanted to warm their feet in bed by electricity and to be able to make the morning cup of tea without getting out of bed. (Laughter and cheers.) They wanted the women to have electrical vacuum cleaners so that they would not have to make the poor old man bang the carpets on the line on Saturday. (Laughter.)

"Mr. Kinneburgh (Electrical Trades Union) seconded, and the resolution was unanimously carried."

The *Daily Herald* reports a speech delivered at Chorley by Mr. Thomas Shaw, Minister of Labour, stating that if the Labour Party was returned to power it would put into operation a big scheme for systematising all systems of electrification in the country. It would run a great network of cables so as to make it possible, not only for the small towns and villages to have electric light and power at reasonable prices, but also to make it possible to develop enormously the use of electricity for power purposes generally. "This is intended not merely for the temporary relief of unemployment, but as a permanent enrichment of the country by making it more efficient, more able to carry on its work, and at the same time making the country infinitely cleaner and healthier."

The Liberal Party.

Mr. Asquith, in his Paisley speech on October 16th, said:—"Britain in the industrial race was in some vital matters falling behind European competitors. One illustration was to be found in the application of electrical power. The progress Britain had made in this direction since the war was not comparable with the progress of either France or Germany. The Liberal Party did not ask that the work should be done by the State at the cost and risk of the taxpayer, but they did say that there should be a generally co-ordinated plan carried out, whether by individuals or corporations, with limitations against abuse, extortionate combinations, or unfair exactions, such as had been provided in the case of the railways."—*Times*.

The Position of the London Companies.

The Political Correspondent of the *Morning Post* stated last week that a group of important Bills dealing with the supply of electricity had been killed by the dissolution of Parliament, and in view of the obscurity that has seemed to hang over the London electricity supply question during the past few weeks, we cannot do better than quote in full the following communication addressed to the *Morning Post* by the chairman of the London Electricity Joint Committee, 1920, Ltd.:—

"Sir,—I notice in your issue of to-day a note under this heading stating that a group of important Private Bills dealing with the supply of electricity have been killed by the dissolution of Parliament, and the note further states that this was due to opposition by Socialist back bench members in contravention of a hitherto accepted understanding.

"As chairman of this company, which is promoting one of the Bills in question on behalf of ten of the London companies, I venture to correct the error which has crept into your paper. As a matter of fact all four Bills are still alive, and have been carried over to the next Parliament by a resolution of each House of Parliament dealing with Private Bills such as has, so far I know, for many years always been passed, and that without opposition, on the dissolution of Parliament.

"It is indeed fair that I should add that neither the Labour Party nor anyone else opposed this resolution in the House of Commons, as will be seen by a reference to 'Hansard,' but when the motion was before the House, Mr. Will Thorne stated that while some of his party felt very strongly on the motion, they did not feel inclined to divide against it in face of the particular circumstances.

"I believe that such a motion has never yet been opposed."

W. F. Fladgate, *Chairman*.

The London Electricity Joint Committee,
1920, Limited, 6, Eccleston Place,
London, S.W.1, October 15th.

The Electrical Power Engineers' Association.

(Southern Division.)

On Saturday last the annual dinner to the members of the National Executive Council was held at the Hotel Cecil, and was well attended. Mr. F. Dives, chairman of the Division, presided, and amongst the guests were Mr. T. A. G. Margary (president of the Association), Mr. W. B. Woodhouse (president I.E.E.), Sir James Devonshire, Mr. A. Page (Electricity Commissioner), and Mr. W. C. P. Tapper (president I.M.E.A.).

After the toast of the King, Mr. Page proposed "The Association," commending its adoption of compulsory arbitration, and expressing his admiration for the men who had been presidents, as well as for the permanent officials and the Executive Council; he said it grew in strength because it merited the confidence and respect of all who came in contact with it. Its policy was founded on the rock of constitutional procedure and on "Whitleyism," and it had always worked for stabilisation. The electrical industry was one of the few bright spots in a very depressing industrial situation; but it would be much brighter if the brakes could be taken off the wheels of progress. In Scandinavia the public were consuming 500 kWh a head—in many towns 800, of which 75 per cent. went for domestic consumption—whilst here the figure was only 200. However, there never was a time when there was so much reason for optimism as to-day. The Electricity Commissioners looked upon the E.P.E.A. as an ally—a strong, efficient, and vigilant body, from which in the great forward push they expected to receive all possible assistance.

Mr. J. H. Parker proposed the toast of "Our Guests," referring gratefully to the work of Mr. W. B. Woodhouse as a pioneer member of the National Joint Board, to the help and encouragement that the Association had received from Sir James Devonshire and his colleagues, and to the goodwill of the Electricity Commissioners. Mr. R. R. Telford then presented to Mr. W. J. Oswald, on behalf of members of the Association, a grand piano, and eulogised his work on the N.J.B. When he took office as president, the N.J.B. had ceased to function, but he and his colleagues brought about a settlement of the trouble. They had now constituted the past presidents an advisory panel, to which the Council could turn for advice in time of need. Mr. Oswald, in reply, expressed his pride in having held the office of president, and suggested that the "brake on the wheels of progress" was called "*ultra vires*." He claimed that the Association had justified its existence not only by improving the position of its members, but also by increasing efficiency and lowering the cost of production. Its objects were not merely to raise the status of its members, but to promote the development of electricity supply, and it meant to do greater things for the electrical industry and for all industry.

Mr. T. A. G. Margary, responding to the toast of "The Association," said that the E.P.E.A. was the first professional association to obtain any economic power in the affairs of the industry. It had accomplished a great deal in a few years, and had now got over the rough ground; it had been compelled to fight with trade-union methods, but that was foreign to its nature. The employers had feared that it might follow the irresponsible methods of other trade unions, and the breakdown of the Joint Board was due to that misapprehension; but while the manual workers' unions were out for higher wages, the Association was out for the good of the electrical industry, and hoped to benefit its members by promoting the prosperity of the industry. It must continue to develop as a strong professional association, and must include everybody from the chief engineer to the youngest apprentice. Chief engineers never died, nor did they "fade away"; their organisation had never succeeded in doing anything, but if it were amalgamated with the E.P.E.A., it might effect something. In the training of engineers they must see to it that a proper business training was included; otherwise the commercial man would secure the leading part and would play for safety, which would be fatal to the success of the industry. In the Fuel Report of the Electricity Commissioners, Manchester took the lead with an efficiency of 20 per cent. That was the wrong way to put it. They must bear in mind that the best power station in this country had a loss of 80 per cent.

Sir James Devonshire, responding for the guests, remarked that his company was supplying electricity for cooking the food of the boys at Haileybury College—the result of private enterprise. Mr. W. C. P. Tapper, responding, pointed out that the I.M.E.A. appointed the original municipal members of the National Joint Board, on which he served during the troublous times when they were getting the schedule adopted. The work was well done, and if the Whitley system required any evidence of its efficiency, it could be found in the electricity supply industry, which had enjoyed peace, thanks largely to the E.P.E.A., whilst other industries were paralysed with disputes. The success of the Association was due to its policy of acting always in a constitutional manner, and he wished it prosperity. Mr. A. H. Allen also responded, congratulating the Association on its success, to which the past presidents had so largely contributed.

The speeches were interspersed with a musical programme, and Mr. Leece proposed a vote of thanks to the artistes who had helped to make the evening so successful.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus, which will be published if considered of sufficient interest.

A New Burglar Alarm System.

MESSRS. S. G. LEACH & CO., LTD., 26-30, Artillery Lane, E.C.1, have introduced a burglar alarm system, one of the principal features of which is a large siren (fig. 1). This, as well as being an alarm, is calculated to scare a burglar from the premises, and a demonstration gives ample force to this claim.

When used in a shop or bank the alarm is operated by a foot switch beneath the counter. This has a mercury contact device which puts the siren into circuit by means of a relay. If the system is tampered with, *i.e.*, short-circuited or cut in

Fig. 1.—A Siren Burglar Alarm.

any way, a signal lamp and bell in a subsidiary circuit are operated by means of relays which are normally retained in position by small electromagnets. The necessary energy for the siren is obtained from a dry battery, which, it is claimed, will give service for several years.

It should be noted that unless the foot-switch is operated a false alarm cannot be given by means of the siren, it is only possible to ring the auxiliary bell, which is not so disturbing. The bell would also ring, of course, if the battery should fail. The system can be adapted for several purposes, *e.g.*, a long counter can be equipped with a special foot-bar to operate the device.

The "Botrade Q" Switch.

Fig. 2 illustrates the "Botrade Q" switch recently placed upon the market by MESSRS. S. BILL & CO., LTD., Queen's Road, Aston, Birmingham. This has a quick-make and quick-break action, with no loose pins or pegs, and the handle is, as

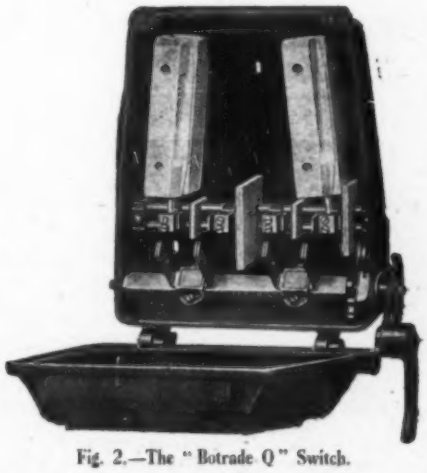


Fig. 2.—The "Botrade Q" Switch.

usual, interlocked with the lid. The operating spring is not in tension when the switch is in either the "on" or "off" positions, and the shock is taken by special stops and not by the contacts. The insulation is of micanite upon iron; the wiring space allowed is adequate; and the handle is of "unbreakable" malleable cast iron.

M.V. "Vickcen" Centrifugal Separators.

Centrifugal separators, claimed to be of entirely British design and manufacture, have been introduced by the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., of Trafford Park, Manchester, for cleaning oils of all kinds, whether insulating, lubricating or fuel. No blotter sheets or other filtering media are used, the centrifugal action separating rapidly finely

divided matter that might not settle by gravity in many hours of complete rest. Switchgear and transformer oil can be cheaply freed from water and sludge, and the separators are suitable for land and marine service, being undisturbed by a ship's motion. Both stationary and portable patterns are made, either belt or motor driven, and the driving power varies from 2 h.p. for the 600 g.p.h. to ¼ h.p. for the 10 g.p.h. sizes. All parts are built to limit gauges on an interchangeable basis, and replacements can be obtained at short notice. Experimental and demonstration works are maintained at Peckham, London.

A Novel Condenser.

The "Balcon" condenser (fig. 3) brought out by the Pacent Electric Co., 22, Park Place, New York City, consists of two nickel-plated electrodes, their ends being 3/16ths in. apart and enclosed in a ¼-in. glass tube. Around the outside a piece of

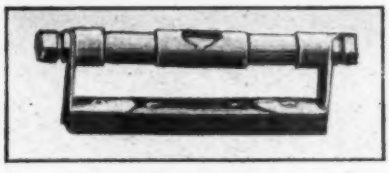


Fig. 3.—A New Form of Condenser.

split brass tubing ¾-in. long is fitted so that it may be moved from one end of the glass tube to the other, thus forming a condenser of low capacity, the glass tube forming the dielectric. The condenser is especially designed for use with tuned radio frequency circuits or any other circuit where a capacity balance is desired.—*Electrical Merchandising.*

Motor Car Rear Signalling Device.

A combined motor car rear lamp and night signalling device has been invented by Mr. R. S. Wade, of 106, Dulwich Village, S.E., which is claimed to satisfy the legal requirements as to rear lighting, and at the same time is capable of giving four separate driving signals to a following motorist. The lamp is circular, 5¼ in. in diameter, and electrically lighted. Into its metal face are cut four slots, forming the four arms of a cross —two vertical and two horizontal. A side slot directs white light on to the car number plate in the normal way, but the four slots, or arms, on the front of the lamp may be illuminated by means of a 4-way switch on the dashboard so as to give at will, in red, any of the following driving signals:—(1) Two vertical and left horizontal, meaning "I am turning left." (2) Two vertical and right horizontal, meaning "I am turning right." ((3) Two vertical, meaning "I am going straight on." (4) Two horizontal, meaning "I am going to stop." The ready intelligibility of the signals, which are said to be clearly visible at 60 yards, is due to the fact that they follow so closely the daylight signals. The name "Foreway Safety Lamp" has been given to the new device. It is applicable, of course, to any form of electrically-lighted vehicle.

Legal.

Southport Corporation v. The Birkdale District Electric Supply Co.

The Southport Corporation has applied for an injunction against the Birkdale District Electric Supply Co. alleging that the latter is charging consumers in Birkdale at lower rates than the Corporation is charging in the borough. The case is due to come before the Courts on November 6th.

Alleged Wireless "Patent" Fraud.

An alleged fraud in connection with broadcasting was referred to in a case at Stratford Police Court on October 14th, when Austin Gordon Pinnock, 26, electrical engineer, was charged with obtaining £19 by false pretences from a Walthamstow engineer. The latter, in evidence, stated that the accused told him that his firm had promised to assist him with his invention, the "Selective Wireless Controller." Subsequently he brought witness a letter purporting to be signed by Lord Gainford, chairman of the British Broadcasting Company, which, addressed to Pinnock, contained the following sentences:—

"We beg to confirm by letter the result of our recent conversation. We are prepared to give the sum of £40,000 for the patent rights of the British Empire. . . . We again wish to remind you that the proposed transaction concerning the patent wireless selective controller with ourselves is to be treated as entirely confidential until after the special board meeting has sanctioned the drawing of the cheque in your favour for the amount mentioned above."

The Clerk of the Court stated that the letter was not written on behalf of the company, and the prosecutor added that he would not have parted with any money if he had not thought it was genuine. Pinnock was remanded in custody.—*The Times.*

Broderick Electric Supplies Co., Ltd., v. Raven.

At Marylebone County Court, on October 14th, before Judge Scully, the Broderick Electric Supplies Co., Ltd., electricians, Theobald's Road, W.C., sued C. Raven, Hampstead, for £16 14s. 8d., the price of goods sold and delivered. It was stated that the goods were supplied between January, 1922, and July, 1923. Defendant had contended that all the goods had been paid for, but certain of them had not been credited to him, although he obtained a receipt for them. Altogether he obtained goods to the value of £92 6s. 10d. It was added that defendant had never complied with the order for discovery of documents.

Defendant stated that he had not been credited for a sum which he paid in January, 1923.

His Honour asked if any person was present when that sum was paid. The defendant replied in the negative, and said that the accountant made out the receipt.

The case was adjourned for the accountant's evidence.

Dublin and Lucan Electric Railway.

Mr. Justice Murnaghan, in the Free State High Court, Dublin, recently, made an order appointing Mr. John Foxall, stockbroker, Angelsey Street, Dublin, the present trustee of an indenture dated March 9th, 1891, receiver and manager of the Dublin & Lucan Electric Railway Co., with liberty to borrow such a sum, not exceeding £1,000, as might be necessary for the purpose of carrying on the undertaking of the railway, pending negotiations for sale.

Mr. Moloney informed his Lordship that the company was at present insolvent, and that the railway was being run at a loss. The question was really one for the debenture holders. The circumstances were such that it was desirable that the concern should be kept going until a sale of the property was effected. There were certain negotiations on foot, but the difficulty arose that there were other parties concerned altogether outside the negotiating parties.

The Judge said the order appeared to be in the interest of the debenture stockholders.

Lapish v. Braithwaite.

On October 17th the Court of Appeal, consisting of Lords Justices Bankes, Scrutton, and Atkin, heard an appeal by the defendant in this case from a decision of the late Mr. Justice Bailhache. The appellant was an alderman of the Leeds City Council, and at the same time the managing director of several firms which had received contracts from the City Council. The plaintiff in the lower Court was a citizen of Leeds who wanted to establish the principle enunciated in the Municipal Corporations Act, 1882, that persons "interested" in municipal contracts should not be members of the body dealing with them.

After hearing a re-statement of the facts elicited before the late Mr. Justice Bailhache, their Lordships reserved judgment.

British Thomson-Houston Litigation.

On October 20th, applications were made to the Court of Appeal, consisting of the Master of the Rolls, and Lords Justices Warrington and Sargant, on behalf of the defendants in the actions by the British Thomson-Houston Co., Ltd., against Crowther & Osborn, Ltd., and Horn & Kremenezky (*vide* Elec. Rev., August 8th, p. 235), that the appeals which they had entered against injunctions and ancillary relief granted to the plaintiff company might be held over until the House of Lords had delivered judgment in the matter of the British Thomson-Houston Co., Ltd., *v.* The British Insulated and Helsby Cables, Ltd.

After hearing arguments from both parties, the Court granted the applications and the appeals were postponed until one month after the House of Lords decision. Applications for security of costs by the B.T.H. Company were also directed to stand over, and the question of costs was reserved.

An All-Electric Colliery.—The chief feature of the new Hilton Main Colliery, Cannock Chase, Staffordshire, which was recently formally opened is that it is all-electric. Electricity is the only power used for the winding motor at the pithead and for other purposes above and below ground. The cylindro-conical winder is driven by a 1,350-3,380-h.p. induction motor, and will deal with an output of 300 tons of coal per hour; the cages have three decks, allowing nine tubs to be brought to the surface at each wind. On arrival at the pithead the tubs of coal are elevated to the screens by an electrically-driven creeper on a gradient of one in five. A revolving tipper deposits the coal on to the main picking belt, which, travelling on ball-bearings, requires a minimum amount of electric power to drive it.

Correspondence.

***Correspondents should forward their communications* at the earliest possible moment.** *No letter can be published unless we have the writer's name and address in our possession.*

Regulations.

What a marvellous industry electricity supply must be. If it were not, it would have been killed (not merely crippled and hindered) years ago by regulations.

We are regulated by Acts of Parliament, the Electricity Commissioners, the Home Office, politicians, &c., &c. These we cannot help—we have to grin and bear them—but now come our own regulations (save us from our friends!), the Regulations for the Electrical Equipment of Buildings (formerly I.E.E. Wiring Rules), 8th Edition, 1924, which consist of 124 pages of panic anti-progress publicity literature, a sort of scare-crow to keep the public off the electrical corn which is really intended for their consumption.

I don't care how much of this sort of stuff the "high-brows" put into specifications of their own conception for wealthy clients who can afford to pay a fat price for the job and something over for the literature, but the public want a cheap and abundant supply of electricity, and to use it they must have cheap, reasonable, and efficient installations at no more cost than is absolutely necessary.

A contractor who conscientiously carried out all these regulations would soon find himself in Carey Street, because the majority of contractors who would ignore the regulations but nevertheless do decent, safe work would get all the orders.

Ridiculous regulations are always ignored in this country. I have no doubt these will be ignored, but it would be better still to have them abolished.

How is it that gas—a far more dangerous industry—has escaped all these abominable interferences, though it is known by those who wish to die to be as useful as cocaine or other regulated poisons?

The only answer seems to be that the gas industry is run by business men of real commercial ability.

I, for one, will have none of the new regulations, and I hope that all real believers in the fact that the electrical age has arrived will be with me.

What a pity that the energy that has been spent in drafting these regulations was not spent in securing legislation to make it illegal for an incompetent man to put in an electrical installation! We are registering contractors now. Why, if we are only registering competent persons, do we proceed to tie them up in red tape?

Every supply engineer, contractor, factor, cable maker, and manufacturer must arise and say to the Wiring Rules Committee: "The enormous progress taking place at the present day due to our hard labour in the past must not be checked, at least by our own side."

L. L. Robinson.

Electricity Department, Hackney,
October 16th, 1924.

A Modern Electric Flat.

In reply to Mr. Hall, I should like to give my experience of an all-electric house. For just over eight years I used electricity for everything, including cooking, heating, lighting, tire pump, vacuum cleaner, bed warmers, piano, sewing machine, ironing, washing machine, and a garage lathe; up to 1914, a winter quarter bill averaged less than ¾d. per unit and summer quarters about 1¼d., a heavy winter quarter amounting to nearly 2,000 units. A load of coal lasted twelve months. During the war the cost went up considerably, but we are now nearly down to 1914 prices.

Now with electricity at about a penny per unit, gas is not in it, leaving out any question of the danger of being poisoned or blown up, and the fact that all metal work, such as brass bedsteads, gas fittings, picture chains, &c., goes rotten in a few years due to gas, to say nothing of the dirty ceilings, curtains, &c. It may interest gas salesmen to know that in the last few months about five hundred electric cookers have been installed in Manchester and anyone who has ever "done it the electric way" has no further use for gas, and but for the fact that such large profits are made out of rubbishy gas which enables the gas department to supply gas cookers free and fix them on the same terms, electric cooking would come into its own more quickly than it is doing.

Why, even the chairman of our gas department (who believes in gas implicitly) uses electricity!

In our business premises, we use no gas or coal and we can have boiling water (electrically) instantaneously at any time. By instantaneously I mean a pot of tea can be made in 80 seconds from the time of switching on, the cost not exceeding 0.14 of a penny, 100 per cent. efficiency.

Gas man had better look out, we are after him!

E. O. Walker.

Manchester, *October 14th*, 1924.

Radio Transformer Characteristics.

I had intended taking no further part in this correspondence, but I feel obliged to point out some of the fallacies in the letter in your current issue, and in your postscript.

With regard to the statement that the Marconi "Ideal" transformer is not as universal in its application as the "R.I.," I see no reason why the 4 to 1 ratio type of "Ideal" should not be just as universal in its application as the "R.I." 4 to 1 type. As a matter of fact I have the curves of this transformer (4 to 1), and with some valves they are considerably better than shown by the figures which I gave in one of my letters. The crux of the matter is that the manufacturers of the "Ideal" transformer are sufficiently experienced to recognise that to obtain distortionless amplification with *several stages* of l.f. amplification, it is necessary to have different types of transformers, and other manufacturers have realised it also.

Mr. Turner is making the same mistake as Messrs. R.I. in calling the N.P.L. report a "certificate." I made no objection to the publication of the report on the test as such, showing what the instrument could do or could not do, and the object of Mr. Coleman and myself was simply to explain to the general public the true meaning of the curve, which was not only not explained but actually obscured.

The last sentence in your postscript amounts to this: that, because a transformer with a perfectly uniform characteristic curve for all frequencies, when combined with valves, horn, &c., will not reproduce all frequencies without distortion; *therefore* it is not necessary to have a transformer with a straight horizontal characteristic, which *is* absurd.

Mr. D. W. Dye, of the N.P.L., is publishing a series of articles in one of the wireless publications on the correct design of a l.f. transformer, and I think you will find my contentions fully borne out therein.

D. V. Onslow.

London, *October 17th*, 1924.

[Achromatic lenses are made by using the defects of one kind of glass to correct the defects of another. It is not absurd, therefore, to suggest that by combining apparatus, each of which possesses inherent defects of its own, a satisfactory combination may result which could not otherwise be attained.—EDS. ELEC. REV.]

Cable Network Losses.

Is there a figure (approximate), expressed as a percentage of the "units sent out" from a power station, which gives the value of the units lost in the cable network, the "units sent out" being taken over some definite period—for example, three months?

What would be considered an average figure?

Ignoramus.

October 13th, 1924.

Trade Terms to Educational Establishments.

Some few months ago I had put before me a circular issued by the London University College Stores Department to certain electrical firms, asking them to quote for certain supplies, and to give the best trade and cash discounts that they would allow.

On taking this matter up with some of the larger manufacturers of electrical accessories, and also with the Electrical Wholesalers' Federation, I have been able to report to my Committee that in the opinion of such traders, the University College should not be allowed the discount which is recognised as applying to the trade.

Leonard G. Tate,
General Secretary,
THE N.E.C.T.A., LTD.

London, *October 20th*, 1924.

St. Dunstan's.—We have received a copy of the ninth annual report of St. Dunstan's—an organisation which stands practically by itself in its unique claims upon public interest. Unfortunately, cases of blindness following upon and due to war service are still arising and may continue to do so, and the doors of St. Dunstan's must be kept wide open for their reception and training for life. Rigid economies have been exercised wherever they could be without affecting the completeness or efficiency of the service, but it must be remembered that nine-tenths of the income has to be raised by appeals to the public. Send what you can to help to the Headquarters, Inner Circle, Regent's Park, N.W.1, addressed to Captain Ian Fraser, C.B.E., the chairman!

Motor-car Ignition Troubles in Peru.—In a report recently drawn up as to the requirements of motor vehicles for use in Peru, the consulting engineer to the Peruvian Ministry of Agriculture states that every car in the provinces of the country which is not fitted with magneto ignition has caused difficulties after being in use a short time. In the case of battery ignition, the accumulators (he states) require care which, although so little, seems to demoralise the drivers, and in Peru the production of distilled water is probably less than a couple of pints daily in every 1,000 square miles; to obtain sulphuric acid is still more difficult. "Our experience shows" (adds the engineer) "that for the motor vehicles of the Irrigation Service there are needed, besides the batteries and distributors for convenient ignition, magnetos that may at a given moment save the situation in the case of a vehicle with an uncharged battery in the midst of a 'pampas' 100 miles from a place where aid may be secured."

Business Notes.

Bankruptcy Proceedings.—H. W. W. Alford, wireless engineer, of 13, Goldsmith Street, and 261, High Street, Exeter.—The first meeting of the creditors took place at Exeter on Monday, October 13th, and the public examination on October 16th. Debtor's liabilities to 21 unsecured creditors amounted to £408, the whole of which is expected to rank for dividend. The only assets are £43 cash in the hands of the sheriff, making the deficiency £366. Debtor attributed his failure to work being insufficient and non-profitable, as he was largely experimenting. The examination was closed.

H. McL. Inglis, assistant electrical engineer, 20, Milner Street, Acomb, Yorkshire.—Receiving order made October 14th, on debtor's own petition.

F. A. Watkins, electrical engineer, 57, High Street, Hythe, Kent.—Trustee, Mr. E. H. Hawkins, 4, Charterhouse Square, E.C.1, released July 21st.

W. H. Vevers (W. H. Vevers & Son), builder and decorator, sanitary and electrical engineer.—Trustee, Mr. W. Boniface, 10, Serjeants' Inn, E.C.1, released August 13th.

C. K. Wallis, electrical engineer, Bedford Street and Longford Road, Bognor.—Last day for proofs for dividend, October 31st. Trustee, Mr. G. H. Acheson, Official Receiver, 12a, Marlborough Place, Brighton.

H. Rhodes (Victoria Electrical Co.), cinema operator, Victoria Buildings, Keswick.—Last day for proofs for dividend, November 4th. Trustee, Mr. K. J. Hough, Official Receiver, 34, Fisher Street, Carlisle.

H. J. W. Embury (separate estate), trading with K. S. Embury as H. & K. Embury, 110 & 29, Queen Street, Newton Abbot.—Supplemental dividend of 2s. 4d. in the £, payable October 28th, at 23, Catherine Street, Exeter.

D. Bould, motor and electrical engineer, Burn Croft, Birchencliffe, Huddersfield.—Second and final dividend of 8¼d. in the £, payable at the Official Receiver's office, 12, Duke Street, Bradford.

S. G. Wilkinson, electrician, 76, High Road, Wembley.—First and final dividend of 4¼d. in the £, payable at the Official Receiver's office, 29, Russell Square, W.C.

W. G. Bayman, electrical engineer, late of 13, Russell Street, Plymouth.—First meeting, October 21st, at 29, Russell Square, W.C. Public examination, November 27th, at the Court House, Wandsworth, S.W.

E. W. J. Whitelock, electrical engineer, 4, Leagrave Road, and 7, Cheapside, Luton.—Application for discharge to be heard November 11th, at the Court House, Luton.

J. A. Bosher, 33, High Street, Aberdare, electrical engineer and contractor.—The public examination of this debtor was held on October 17th at Aberdare. The statement of affairs showed a deficiency of £771. Debtor attributed his failure to trade depression. It appeared that the business was successful until the coal strike of 1921, after which it fell away considerably. The examination was adjourned.

Company Liquidations.—Morgans (Birmingham) Electric Motors, Ltd., Birmingham.—A meeting of the creditors of the above was held on October 14th, at 39, Corporation Street, Birmingham, when Mr. H. J. Loveridge, the Liquidator in the voluntary liquidation of the company, submitted a statement of affairs which showed liabilities of £1,292, made up as follows: Unsecured creditors, £735; bank overdraft, £432; and contingent liabilities, £124. The assets were estimated to realise £1,552, from which had to be deducted £20 for preferential claims, leaving net assets of £1,532, or a surplus so far as the creditors were concerned of £240. The assets consisted of: Book debts, expected to produce £163; plant, £750, estimated to realise £250; loose tools, £207; patents, £169; stock-in-trade, £454; and patterns, £310. The claim of the bank had been guaranteed. The company was formed in November, 1921, with the object of starting a new business. No directors' fees had ever been paid, while Mr. S. B. Morgan, who was entitled to draw a salary, never received anything. The present position of the company was attributed to losses on trading, and it was pointed out that in respect of one order for seven motors valued at about £300, they proved to be unsatisfactory, and were rejected. There was also an expenditure of £250 in removing to the present premises. A resolution was passed confirming the voluntary liquidation of the company with the present Liquidator.

Kearney High Speed Railway Co., Ltd.—Winding up order made by the High Court on October 14th.

Tele Dis Services (Founders) Co., Ltd.—Winding up order made by the High Court on October 14th.

Crittall Manufacturing Co., Ltd.—Winding up voluntarily for reconstruction purposes. Liquidator, Mr. F. G. Rogers, Courtauld Road, Bocking, Braintree.

Dissolutions of Partnership.—Wireless Syndicate, wireless accessory dealers, 6, Broad Street Place, E.C.—Mr. W. Williams and Mr. C. B. Stokes have dissolved partnership. Mr. Williams will attend to debts and continue the business.

Williams & Co., N. Williams & Co., and Williams and Whittaker, electrical engineers, 4, Queen's Square, Blackpool.—Mr. N. Williams and Mr. W. Whittaker have dissolved partnership. Debts will be attended to by Mr. Williams, who will continue the business under the old styles.

Private Arrangements.—A. E. Morgan and J. J. Saynor, trading as Morgan & Saynor, electricians and plumbers, 32, Sadler Street, Durham.—A meeting of the creditors of the above was held recently, at the offices of Messrs. J. W. Armstrong & Sons, accountants, 2, Collingwood Street, Newcastle-upon-Tyne. The representative of the Sun Electrical Co., Ltd., creditors for £228, was elected to the chair. The statement of affairs presented showed liabilities of £610, all of which were due to unsecured creditors. The net assets were £364. Mr. Saynor attended the meeting, and explained that his partner had secured a position in another district, and had left Durham. A writ had been issued by one creditor, and, acting under advice, a deed of assignment had been executed, but had not been registered. The deficiency was accounted for by the fact that the profits were insufficient to support both partners. Mr. Saynor was anxious to continue the business. A resolution was passed confirming the deed already executed to Mr. J. W. Armstrong, and it was decided to accept a composition of 10s. in the £, payable as to 5s. in one month, 2s. 6d. in three months, and 2s. 6d. in six months. The instalments were to be secured to the satisfaction of the trustee, failing which the estate was to be wound up under the deed.

Trade Announcements.—The Walker Electrical Service has removed to larger premises in Annandale Street, Edinburgh.

The address of the Chili Telephone Co., Ltd., has been changed to Finsbury Pavement House, Moorgate, E.C.2.

Messrs. Bentalls, of Kingston-on-Thames, have greatly enlarged their electrical and wireless department, which has been removed to a new annexe.

The address of the London office of the Chloride Electrical Storage Co., Ltd., is now 137, Victoria Street, S.W.1. The showrooms at 219-229, Shaftesbury Avenue, W.C.2, are being continued.

Messrs. Wm. C. Yuille & Co., Ltd., have removed their registered office and showroom to 155a, St. Vincent Street, and their trade counter to 70, St. Vincent Street, Glasgow.

Catalogues and Lists.—Messrs. Watson & Sons (Electro-Medical), Ltd., Sunic House, Parker Street, Kingsway, W.C.2.—Bulletin No. 67, containing notes on photo-therapy and ultra-violet radiation for therapeutic use, with details of the most suitable generating apparatus. Illustrated and priced.

Simplex Conduits, Ltd., Garrison Lane, Birmingham.—A leaflet advertising the company's conduit.

Messrs. E. P. Allam & Co., 107-109, Gray's Inn Road, W.C.1.—A price list of "Planet" a.c. motors and a list of d.c. motors in stock.

The British Thomson-Houston Co., Ltd., Crown House, Aldwych, W.C.2.—An illustrated and priced folder advertising shop-window lighting apparatus.

An illustrated price-sheet of radio accessories, including batteries and measuring instruments.

Messrs. Heyes & Co., Ltd., Water-Heyes Electrical Works, Wigan.—An illustrated booklet dealing with flameproof switchgear, mining telephones, lighting fittings, bells, &c.

The Hendon Electric Lamp Co., Ltd., 104, Southampton Row, W.C.1.—A price list of "Hendon" metal-filament lamps. Also a pamphlet dealing with "Artlight" bowls and shades.

Barimar, Ltd., 14-18, Lamb's Conduit Street, Theobald's Road, W.C.1.—A pamphlet dealing with the firm's welding repair service, &c.

The British Thomson-Houston Co., Ltd., Rugby.—Descriptive List No. 2,141, containing illustrations, details, and dimensions of small-size single and polyphase induction motors. Also Price List No. 5,351-A, describing industrial-type d.c. motor control pillars.

Messrs. L. McMichael, Ltd., Hastings House, Norfolk Street, Strand, W.C.2.—A revised price list of radio sets, components, and accessories.

The English Electric Co., Ltd., Queen's House, Kingsway, W.C.2.—Publication No. 374, dealing with power-house and sub-station switchgear by means of illustrations, diagrams, and brief descriptions.

The Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.—A dial device for determining the duolateral coils required for the reception of various wavelengths.

The M.O. Valve Co., Ltd., Brook Green, Hammersmith, W.6.—"The Book of the M.O. Valve," describing the various patterns, and their advantages, of the company's radio valves. Illustrated.

The Electrical Supplies Co., Ltd., 233, Tottenham Court Road, W.1.—A priced list of radio valves, and a general catalogue of radio accessories.

Engineering & Lighting Equipment Co., Ltd., Sphere Works, St. Albans, Herts.—A well-illustrated and priced catalogue of electric lighting fittings for industrial and commercial use, street lighting fittings, lampholders, and lamps.

Messrs. Crompton & Co., Ltd., Chelmsford.—Leaflets Nos. 240 and 245, dealing respectively with house-lighting and semi-automatic ironclad switchboards.

THE METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Trafford Park, Manchester.—Descriptive leaflets: No. 341/8-1, illustrating and describing the "Type FB" supersensitive instantaneous relay; No. 341/10-1a, dealing with the "Type PB" inverse time-limit overload relay; and No. 405/3-1, describing the Metropolitan-Vickers supervisory power-station control system. Also Descriptive Leaflets Nos. 379/4-1 and 382/1-1, dealing with air-cooled and oil-immersed distribution transformers.

MESSRS. VERITYS, LTD., Aston, Birmingham.—Publication No. 955, containing details, illustrations and prices of "Aston" switch- and fuse-gear, motor starters, starting panels, &c., for d.c. and a.c.

MESSRS. S. G. LEACH & CO., LTD., 26-30, Artillery Lane, E.C.—A pamphlet describing the "Runsyne" advertising device.

Spanish Electrical Exhibition.—Arrangements are in hand for the holding of an electrical exhibition with a section devoted to radio apparatus, in Madrid, the opening date being fixed for December 28th. Applications for space must be sent by November 10th to the Empresa Electricas, Banco Hispano-Suiza, 3, Plaza de Canalejas, Madrid.

Electricity Supply Workers' Wages.—The Special Tribunal of the National Joint Industrial Council for the Electricity Supply Industry, appointed to consider the application of power station employés for a wage advance of 10s. per week, has issued its report. It is the opinion of the Tribunal that no case has been made out for the granting of the increase, but it considers that District Councils should be asked to examine the existing rates of pay, having in mind the prosperity of the industry in their respective areas and to special reductions which were effected in certain areas in 1922 or 1923. In this connection attention should be given by the councils to those districts in which there appear to be grades of employés whose rates materially differ from the rates of corresponding grades in other areas. The Tribunal further suggests that pending the decisions of the District Councils, the operation of the sliding scale and the notice issued by the National Council on July 19th should be suspended. If any District Council should be unable to agree upon any matters under its consideration, the dispute should be submitted to the National Council, and if a decision cannot then be reached, the Tribunal should be given the opportunity of making recommendations. The general reasons given by the Tribunal in support of its decision are that the increased level of wages above that of 1914 is in excess of the increased cost of living; that the level of wages in the electricity supply industry as compared with the wages paid in the principal industries using electrical power is higher than the average, but not so high as in some cases referred to at the hearing, and generally the conditions of employment are more secure; that the industry is growing rapidly, and, generally speaking, has become increasingly prosperous in the past year.

The National Council is to meet on November 14th to consider the report of the Tribunal, and no action will be taken by either side until a decision has been reached by the Council.

Book Notices.—The *Journal* of the Institution of Electrical Engineers. Vol. LXII. No. 334. October, 1924. London: E. & F. N. Spon, Ltd. Price 10s. 6d.—The October issue contains the following papers:—"Power Circuit Interference with Telegraphs and Telephones," by Mr. S. C. Bartholomew; "A Novel Method of Starting Polyphase Synchronous Motors," by Mr. E. V. Clark; "Coupling Between Two Oscillatory Circuits," by Mr. L. S. Palmer and Mr. H. W. Forshaw; and the Fifteenth Kelvin Lecture: "Kelvin and the Economics of the Generation and Distribution of Electrical Energy," by Mr. G. Semenza.

"The Wireless Constructor." Vol. I. No. 1. November, 1924. London: Radio Press, Ltd. Price 6d. monthly.

"Switchgear for Electric Power Control," by E. B. Wedmore and H. Trencham. Pp. xii+335; figs. 202. London: Oxford University Press. Price 25s. net.

British Empire Exhibition Notes.—The Ottawa correspondent of *The Times* says that in connection with the proposal for the continuance of the British Empire Exhibition for another year, Mr. Low, Minister of Trade and Commerce, states that the Canadian Government has practically decided to continue its exhibits at Wembley next summer.

On the other hand, the New Zealand Government has decided that it cannot continue its exhibit for another year. One reason for this is the large part which the Government is taking in the New Zealand and South Seas Exhibition which is to be held in Dunedin next year.

Committee on Industry and Trade.—A meeting of the Committee on Industry and Trade was held on October 15th. The information and statistics prepared by the various Government Departments at the Committee's request were reviewed, and the arrangements for taking evidence were discussed. A considerable number of organisations are already preparing evidence for the Committee, and it was decided that invitations should also be issued to a number of other bodies from whom evidence is desired. Owing to the General Election, the evidence which it had been arranged to take at the meeting was postponed. For the same reason it was decided to hold no further meetings until after October 29th, but to meet again shortly after that date, and to begin the taking of evidence, which would be continued thereafter at regular intervals.—*The Times.*

New Indian Companies.—Among the new companies recently organised in India to undertake the supply of electricity for lighting and power purposes are the Rander Electric Supply Co., at Rander, and the Trichinopoly Srirangam Electricity Supply Co., of Trichinopoly, Madras; capital 500,000 rupees.

Corrections.—Messrs. The Metropolitan-Vickers Electrical Co., Ltd., of Trafford Park, ask us to draw attention to an error which occurred in their advertisement of e.h.p. switchgear, appearing on p. 19 of the Supplement in last week's ELECTRICAL REVIEW. The voltage given on the eleventh line should be 35,000 volts, *not* 3,500. The type "K" switch is a completely armourclad and interlocked unit, and is suitable for 35,000 volts at 600 amps.

Messrs. The Midland Electric Manufacturing Co., Ltd., of Birmingham, also wish to correct a typographical error which they inadvertently passed in their advertisement appearing on p. xiv of our advertisement pages last week. In the account of the tests of the new "Memette" switch at the Birmingham University Electrical Laboratory it was stated that the switch, which was rated at 15 amps. on 250 volts, "broke 2,000 amps. at 250 V satisfactorily." This was, of course, an error for 200 amps. Under the test as conducted they were unable to discover the breakdown point, as the current available did not exceed 200 amps. at 250 V.

Patent Application.—Application has been made for the restoration of Patent No. 149,687 of 1919 granted to Max Rockstroph for "Improvements in recording dynamometers."

British Trade-mark Applications.—The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from the date mentioned. In the case of foreign applications the name and address of the British representatives are also given:—

Vulcanium. No. 451,036. Class 4.—An electrical insulating substance. The North British Rubber Co., Ltd., Fountainbridge, Edinburgh. October 15th, 1924.

Transant. No. 439,726. Class 8.—Crystal sets, valve sets, and transformers, all for use in radio telephony. William Henry Tant, trading as W. H. Tant & Co., 107, Dollman Street, Vauxhall, Birmingham. October 15th, 1924.

Kenbar. No. 450,731. Class 8.—Philosophical and scientific instruments and apparatus, &c. John Barker & Co., Ltd., 83, High Street, Kensington, W.8. October 15th, 1924.

Sonoradio, Clear as a Bell (lettering and design). No. 447,761. Class 8. Instruments and apparatus for use in radio telephony and telegraphy and combination phonographs and radio receiving sets. Sonora Inc., 279, Broadway, New York, U.S.A. (White, Langner, Stevens & Parry, Jessel Chambers, 88-90, Chancery Lane, London, W.C.2.) October 15th, 1924.

Frequon. No. 451,408. Class 8.—Component parts of radio apparatus. H. E. Ashdown (Birmingham), Ltd., 36a, Aldridge Road, Perry Barr, Birmingham. October 15th, 1924.

Everay (lettering and design). No. 448,365. Class 11.—Electromedical apparatus for therapeutic purposes. I. Calvete, Ltd., 11, Little Saint Andrew Street, London, W.C.2. October 15th, 1924.

The European Glow Lamp Trade.—With reference to our recent note on this question it is now stated that negotiations are proceeding in Germany with regard to selling prices, &c., and that a Dutch firm is participating in the discussions. The business of the latter is reported to have recently increased not only in international markets, but also in Germany.

Irish Free State Electrical Imports.—The imports of electrical machinery and apparatus and accessories into the Irish Free State during July last attained a value of £33,095, bringing the total for the first seven months of the year to £282,497. The appended table shows the details of the imports and the amount attributed to Great Britain and Northern Ireland. It is pointed out in the official returns that the values show the quantity of goods consigned from the countries mentioned, and that it does not follow that they are all of British manufacture. Of the balance of £18,084 from foreign countries, £7,171 is attributed to Germany and £5,416 to Belgium.

	Total July, 1924.	Seven months 1924. Total.	U.K. share.
	£	£	£
Electric wires and cables ...	10,189	43,922	33,463
Telegraph and telephone instruments	982	21,011	20,907
Electric lamps and parts ...	861	9,722	8,802
Batteries and accumulators ...	2,573	12,322	11,609
Electric lighting accessories and fittings	2,765	15,466	14,956
Radio sets and apparatus ...	3,805	73,142	71,786
Other electrical goods and apparatus	5,998	68,490	65,968
Electric generators	1,601	5,659	5,521
Electric motors	1,670	10,612	10,096
Other electrical machinery ...	2,651	22,148	21,352
Totals	£33,095	£282,494	£264,460

For Sale.—By direction of Geo. Cohen & Armstrong Disposal Corporation, Messrs. Fuller, Horsey & Co., will offer by auction at the National Projectile Factory, Lancaster, on Wednesday, November 19th, plant and machinery, including electrical generating sets, electric cranes, switchboards, electrical fittings, &c. (See our advertisement pages to-day.)

German Electrical Industry.—Following up our leading article of last week regarding the position of the German electrical industry, we quote the following extracts from a review just received by the Department of Overseas Trade from the Commercial Secretary at Berlin. The review is based upon the reports of the Prussian Chambers of Commerce on trade during September, 1924:—"In the electro-technical industry the slight improvement which set in in August was maintained in September. There was everywhere a demand, and only the exceptional shortage of money hindered the placing of new orders. As regards the individual branches of the industry, business in power plant improved. In the telegraphy and telephony branch orders increased somewhat. Business in automatic telephone apparatus continued to make good progress. The factories manufacturing electromedical apparatus were better employed. Orders for fittings for tram-cars increased, while those for electric full-gauge railways were satisfactory. The turnover in incandescent lamps was greater than in the preceding quarter, but smaller than in the corresponding period of last year."

Clinker-Grinding Plant.—The Foundation Co., Ltd., acting on behalf of Messrs. Lafarge, has placed an order with Messrs. Vickers, Ltd., for the first clinker grinding plant, comprising tube mills, installed in this country in connection with the manufacture of *ciment fondu*.

Overhead Line Work in Wales.—In the accompanying photograph we illustrate a view of a mile of route of overhead main at Blaengarw, South Wales, consisting of four spans: 2,800, 325, 475, and 1,600 ft. This is part of nine miles of a 22,000-volt three-phase "Callender-Kay" pole line,

Overhead Line Work in South Wales.

supplied and erected for the South Wales Electrical Power Distribution Co. by Callender's Cable & Construction Co., Ltd.

Sydney Municipal Contracts.—*The Sydney Labour Daily* states that at a meeting of the Sydney City Council, on September 2nd, on the motion of Alderman Stephen, two of the firms who had been punished by a two years' suspension from tendering were restored to their full tendering privileges.

The Production of Aluminium.—According to statistics issued by the Metal Co., of Frankfort-on-Maine, the world's production of aluminium amounted to 165,000 metric tons in 1923, of which 38 per cent. was turned out in Europe. The average for the years 1919-23 is returned at 136,000 metric tons, as against 65,000 tons in 1912-13, of which 57 per cent. was made in Europe. In this connection it is stated that Germany now utilises solely her own raw material for the manufacture of aluminium, and that as soon as the Inn works near Cologne, which is nearly completed, is set in operation, the present German production at the rate of 1,700 tons per month will be so increased that that country will be able to become an exporter of aluminium.

The Engineering Situation in France.—The Paris correspondent of the *Engineer* reports as follows:—"If the French engineering trades have been only partially affected by external causes and have generally found steady employment on account of the reconstruction and other work being carried out in the country, they are certainly now being influenced by the lack of confidence and feeling of distrust arising from the change that has taken place under the Socialist administration. The attitude of the Government towards industrial interests is not conducive to the country's industrial welfare. To the objections of manufacturers against the action of the Government in taking considerable quantities of railway material and manufactured goods from Germany on account of reparations, the Prime Minister has replied that the general interests of the country must take precedence over the interests of particular industries. Locomotive and wagon builders must, therefore, close down their works while Germany is supplying the railway companies with the greater part of the material they need. The only satisfactory feature is the activity being displayed in the carrying out of municipal works and port equipment schemes, and some good colonial contracts are to be given out shortly; but the volume of business is so far restricted that engineering firms are finding the situation less satisfactory than it has been for a long while past. Boilermakers continue to do well on account of the development that is taking place in electrical distribution all over the country."

Copper and Lead Prices.—Messrs. F. Smith & Co. report October 21st:—Copper (electrolytic bars), £67, 10s. increase; do. do. sheets, no change; do. do. wire rods, £77, 10s. increase; do. do. h.c. wire, no change.

Messrs. James & Shakespeare report October 22nd:—Copper bars (best selected), sheet and rod, no change; English pig lead, £37 5s., 20s. increase.

Messrs. C. Clifford & Son report October 21st:—Babbitt's metal and anti-friction metal, Grade I, £227, £11 increase; Grade II, £162, £6 increase; Grade III, £92, £2 increase; platinum bronze wire, 1s. 3½d., ½d. decrease.

L.C.C. Contracts.—The General Purposes Committee of the London County Council recommends an alteration in the Standing Orders relating to the payment for contracts for electrical machinery. Tramway rolling stock is now included in this section, and the method of payment leaves a balance of only 5 per cent. due upon erection. In response to representations, the presidents of the Institutions of Electrical and Mechanical Engineers, as well as the president of the Institution of Civil Engineers, may be asked to appoint an arbitrator to settle disputes arising out of the supply of electrical machinery or tramway rolling stock.

Local Exhibitions.—Glasgow.—The electrical industry is well represented at the Domestic Welfare, Building Trades, House Furnishing, Art, Crafts and Photographic Exhibition recently opened at the Kelvin Hall. As usual, the Corporation Electricity Department is a prominent exhibitor of all kinds of electrical apparatus for household use. At two stands working demonstrations are given of electric cookers, washing machines, fires, and such labour-saving articles as irons, vacuum cleaners, and sewing machines. Other exhibitors show a large variety of electrical appliances. Messrs. Blackie, Fuller & Russell, Ltd., of Glasgow, display radio apparatus, including "Eurekaphone" 4-valve sets and the "Eureka" l.f. transformers. They have also on their stand the "Whirlwind" suction sweeper. Electric vacuum cleaners of the "Record" type are shown by Messrs. A. C. Hodgson, Ltd., of Bury, and also "Vici" electric irons. Electrical fittings for heating and lighting are shown in great variety by Messrs. Horton, King & Smith, of Glasgow, on whose stand are shown electric lamps by the Anti-Vibration Electric Lamp Co.

Other exhibitors are:—The Hotpoint Electric Appliance Co., Ltd., electric irons, vacuum cleaners, "Santon" geysers, ovens, &c.; The Falkirk Iron Co., Ltd., "Falco" electric cookers, new designs of "Falco" electric fires and wash boilers; Singer Sewing Machine Co., Ltd.; William Kemp & Co., an all-electric kitchen, &c.; Arch. Low & Sons, Ltd., Glasgow, "Highlow" electric hot-water tanks for domestic purposes, cookers, ovens, &c.; Messrs. Hoover, Ltd.; Rogers Electric Sales Co. (Great Britain), London, electro-medical appliances, &c.; the J. W. B. Wireless Co.; Donald & McPherson, "National" electric lamps, irons, fires, and complete electric lighting sets; and the Master Supply Co., electric irons, &c.

Manchester Wireless Show.—Under the technical direction of the Manchester Radio Scientific Society, the Manchester *Evening Chronicle* is holding an exhibition at the City Hall, Deansgate, from October 14th to 25th. It was opened by Lord Colwyn, P.C., with Sir Edwin F. Stockton in the chair; there are some 120 stands.

Social Event.—On October 17th the Dick, Kerr Sports Club, Preston, held a carnival dance and whist drive, which was attended by over 800 persons. Novel lighting effects were introduced by the Siemens and English Electric Lamp Co., Ltd. Several prizes were offered for the best fancy dress.

Lighting Publicity.—As a feature of its winter lighting campaign, the Siemens and English Electric Lamp Co., Ltd., is issuing a "Wizard Electric" game, consisting of a board marked from 1 to 100, with appropriate intermediate stations. It is played with a die, as usual, and is calculated to influence the "young idea" in favour of good electric lighting.

Commercial Travellers' Orphans' Day.—Next Tuesday (October 28th), is Orphans' Day, when commercial travellers all over the Kingdom make a special collection among themselves in aid of the Royal Commercial Travellers' Schools at Pinner, which is now maintaining and educating nearly 400 orphans.

Another Wireless Exhibition.—Following the exhibition at the Royal Albert Hall, another radio show is to be held at the White City from November 15th to November 29th. All British manufacturers are invited to exhibit, and the display should, therefore, be a large and representative one.

Rotherham Trolley 'Bus Contract.—MESSRS. CLOUGH, SMITH & Co., LTD., have received a further order from the Rotherham Corporation for the supply of their trolley omnibus chassis as a result of the satisfactory operation of the chassis supplied in 1922 over 100,000 car-miles.

Unemployment.—There was a further increase of 16,280 in the number of unemployed during the week ended October 6th, the total being 1,215,600. The reduction since the beginning of the year was 70,020 at that date.

Rumanian Tariff Changes.—The new rates of import duty involve increases in a number of cases. Electric motors formerly subject to an impost of from 100 to 200 paper leva per 100 kg. are now liable to a tariff of from 300 to 1,005 leva per 100 kg.

Direct Electrical Labour.—The Electrical Section of the Newcastle-on-Tyne and Gateshead Chamber of Commerce recently had under consideration the question of "direct labour" in contradistinction to contract work, and decided to ask the Chamber to protest against the principle of direct labour. The matter was placed before the Council of the Chamber, which referred the question to the General Purposes Committee. The latter body considered the matter on October 15th. Mr. H. W. Clothier said the fact that some local authorities were engaging direct labour in electrical work was only part of a larger issue. He looked upon direct labour as the thin edge of nationalisation.—The chairman (Mr. J. H. Beckingham) mentioned an instance where he engaged a man to do some electrical work, and on the cost so incurred he saved money as compared with what a company would have charged. He did not think the present time was favourable for putting forward the resolution.—Further consideration of the matter was deferred.

Lighting and Power Notes.

Aberdare.—ELECTRICITY AGREEMENT.—The Town Council has entered into an agreement with the Powell Duffryn Steam Coal Co. for a bulk supply of electricity. The company will supply energy at 1d. per kWh for the town and 1½d. for the outlying parts of the district.

Accrington.—LOANS.—The Electricity Commissioners have sanctioned a loan of £6,500 for cooling towers, &c., and the Corporation is applying for a further loan of £20,000 to cover excess expenditure on mains and to provide for further extensions.

Atherton (Lancs.).—YEAR'S WORKING.—The report on the working of the Urban District Council's electricity undertaking for the year ended March 31st last records a profit of £361. The sales of electrical energy increased by 615,063 to 5,287,091 kWh and the number of consumers by 77.

Bath.—NEW PLANT.—The Town Council has adopted a recommendation of the Electric Light Committee that a 25,000-lb. boiler be installed at the electricity works, at a cost of £5,200. This is additional to two 40,000-lb. boilers which are to be installed as part of a larger scheme.

Beckenham.—ELECTRICITY SUPPLY.—The Urban District Council is to carry out extensions of mains in various parts of the district at an estimated cost of £2,386.

Bradford.—LOANS.—The Corporation has received the sanction of the Electricity Commissioners to loans of £12,500 and £50,000 for building work and plant, and has applied for sanction to a further loan of £15,700 for similar purposes.

Burton-on-Trent.—UNEMPLOYMENT RELIEF SCHEME.—The Electricity Committee has submitted a scheme to the Town Council for the extension of its area of electricity supply to adjacent mining and agricultural districts with a view to providing work for the unemployed, and the Town Council has instructed the Town Clerk, the Borough Treasurer, and the Electrical Engineer to interview the Electricity Commissioners with regard to the proposal. Should the whole of the scheme be carried out, it will involve the expenditure of £82,228.

Canada.—HYDRO-ELECTRIC SCHEME.—It is reported that the construction of a hydro-electric power station at Grand Falls, on the St. Croix River, is to be be proceeded with. The initial capacity of the plant will be 60,000 h.p.

Cardiff.—YEAR'S WORKING.—We have received from Mr. C. G. Morley New, city electrical engineer, the report on the working of the electricity undertaking for the year ended March 31st last. The total income was £217,226, as compared with £181,335, and the working expenditure amounted to £89,224, as against £77,106, leaving a gross surplus of £128,001 (£104,229). Capital charges, income tax, and the purchase of new meters absorbed £64,793, and there was a net surplus of £50,483 (£39,436). The capital expenditure during the year amounted to £151,914, the bulk of which was incurred on mains and plant. The transfer of all capital expenditure at Roath power station and that on tramway cables and conduits amounting to £431,313 brings the total for the year to £583,227. The sales of electrical energy increased from 20,040,492 to 23,854,136 kWh, and the average price obtained fell from 2.81d. to 2.18d. per kWh. The maximum supply demanded rose from 8,845 to 12,062 kW. An additional 5,000-kW turbo-alternator was brought into commission in February last, and the plant at Hayes sub-station was increased by a 1,500-kW rotary converter. The maintenance of the tramway cables amounting to approximately 75 miles was taken over at the commencement of the year.

Continental.—FRANCE.—A power station which will have a capacity of 60,000 kW is being established at Pont-a-Vendin by the Société des Mines de Lens to supply electrical energy to its various collieries in the Lens district. Part of the plant has already been completed and put in operation.

SWITZERLAND.—Preparations are being made by the Bernische Kraftwerke Gesellschaft for the construction of a new plant at Handek, near Lake Gelmer, to utilise the water power of the Upper Hasli district. The initial plant will have a capacity of 75,000 h.p., but will eventually be extended to 100,000 h.p. A separate company, to be known as the Kraftwerke Oberhasli Gesellschaft, is being formed to operate the undertaking; it will, however, be under the control of the former company.

BELGIUM.—During the year ending June 30th last the power stations of the Compagnie Electrique Anversoise, of Antwerp, supplied a total of 3,601,666 kWh, an increase of 17.9 per cent. over the preceding twelve months. There was a slight fall, however, in the net profit owing to increased production costs. During the year several new h.p. mains have been laid for the transmission of energy from the station of the Société d'Electricité de l'Escaut. A new transformer station of 3,000-kW capacity is also being established to supply current to the northern suburbs of the city.

Costa Rica.—HYDRO-ELECTRIC DEVELOPMENT.—According to *Commerce Reports*, a new hydro-electric company has been organised in Costa Rica with an initial capital of $175,000 to generate 8,500 h.p. from the Torres, Tirivi, and Virilla Rivers and furnish electrical energy to the city of San Jose and vicinity.

Douglas (Isle of Man).—NEW PLANT.—The Manx Tynwald Court has granted an application of the Town Council for sanction to borrow £45,000 for extensions to the electricity works. It is proposed to install two 400-kW oil engines, dynamos, and other machinery.

Irish Free State.—CLONMEL (CO. TIPPERARY).—Representatives of the Ministry of Commerce and Industry recently held an inquiry into the Corporation's application for an Order to supply electricity in its area, and for a loan of £13,125 to carry out the scheme, which is being opposed by the ratepayers. A decision will be announced in due course.

Jamaica.—HYDRO-ELECTRIC DEVELOPMENT.—According to *The Times Educational Supplement*, a survey has been completed by technical officers of the municipality of Kingston in connection with a proposed hydro-electric scheme to the north of Kingston. A pipe-line 4½ miles in length will convey water from the Hermitage dam, which Messrs. Sir W. G. Armstrong Whitworth & Co. will construct, to the power house about seven miles north of Kingston.

Kingussie.—ELECTRICITY SUPPLY.—A report on the proposed electricity scheme for the burgh, prepared by Messrs. Leslie and Reid, of Edinburgh, was recently submitted to the Town Council. The construction of dam and power house and the installation of plant are estimated to cost £6,000.

London.—HACKNEY.—The Borough Council has decided to install electrical domestic appliances in 48 houses which are at present in course of erection in the borough.

Northern Ireland.—COLERAINE (LONDONDERRY).—A canvass of residents having proved satisfactory, the Urban District Council has decided to proceed with the electricity scheme for the district. It is proposed to charge 2½d. per kWh for power supply and 9d. per kWh for lighting. The cost of the scheme is estimated at £18,000.

ENNISKILLEN.—The Enniskillen Electric Light and Power Co., Ltd., has applied to the Electricity Commissioners for North Ireland for a Special Order authorising it to supply electricity in the urban district and parts of the rural district of Enniskillen.

Perthshire.—ELECTRICITY SCHEME.—The Scottish Central Electric Power Co. has applied to the Central District Committee of the County Council for permission to erect an overhead transmission line to Forth Bank and Manor Powis. According to the surveyor, the company also proposes to lay an underground 6,000-V h.p. cable.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

RHONDDA.—Lighting: A reduction of ½d. per kWh.

CARDIFF.—In view of a favourable coal contract entered into by the Corporation Electricity Committee, the following further reductions in the electricity charges recently announced (ELEC. REV., October 10th) have been made:—Lighting:—Flat rate: A reduction of ½d. per kWh. Maximum demand rate: A further reduction of ½d. per kWh on rates below

the ordinary rate down to 3½d., and a further 1/16d. per kWh in addition to those previously recommended on rates below 3½d.

Sheffield.—Mains Extensions.—The Electricity Committee is to carry out extensions to mains, at an estimated cost of £7,205.

Special Orders.—The Electricity Commissioners have submitted the following Special Electricity Orders to the Minister of Transport for confirmation:—Staines (Extension) in favour of the Egham and Staines Electricity Co., Ltd.; Saltburn-by-the-Sea, granted to the Cleveland Trust, Ltd.; East Retford and district, to the East Retford Borough Council.

Application has been made to the Commissioners by Mr. H. B. Prescott-Westcar for an Order to supply electricity in the urban district of Herne Bay, the rural district of Blean, and certain parishes in the rural district of Faversham.

Stirlingshire.—Opposition to Schemes Withdrawn.—The County Council has withdrawn its opposition to the Grampian Electricity Supply Bill and the Falkirk and Linlithgow Electricity Extension Order.

Swansea. — Electricity Supply.—The Corporation has adopted a scheme submitted by the borough electrical engineer for the distribution of electricity in areas of the borough which at present do not receive a supply, involving an expenditure of £100,000. The scheme is to be submitted to the Electricity Commissioners, and 25 per cent. of the work will be put in hand as soon as their sanction has been received.

Tetbury.—Inauguration of Electricity Supply.—The Urban District Council's electricity undertaking was formally inaugurated on October 9th.

Torquay.—New Plant.—Subject to sanction to a loan being received from the Electricity Commissioners, the Town Council is to install another 3,000-kW set at the Newton Abbot power station, at an estimated cost of £45,671.

Walsall.—Electricity Supply.—The Electricity Committee proposes to complete the ring main for supplying collieries in the adjacent district at an estimated cost of £21,000. This scheme was reported upon by the Committee in September, 1922, and a portion of the main has been laid at an outlay of £21,000. The present extension is to meet the demand for further supplies of current for collieries at Brownhills and Wyrley. A further expenditure of £1,908 is contemplated in connection with the provision of additional plant at Birchills generating station.

Warwickshire.—Special Order.—The Leamington and Warwick Electrical Co., Ltd., has applied to the Electricity Commissioners for a Special Order authorising it to extend its area of electricity supply so as to include certain parishes in the rural districts of Southam, Stratford-on-Avon, and Warwick.

Tramway and Railway Notes.

Brazil.—Railway Electrification.—The Companhia Guarirga proposes to electrify its line, which stretches across the island of Santo Amaro.

Continental.—Switzerland.—Plans are being prepared for the electrification of the railway between Lake Constance and Toggenburg.

Edinburgh.—New Route.—The Corporation has approved extensions to the tramway system at an estimated cost of £83,413. The expenditure of £33,948 on the Chesser Avenue and Salamander Street extensions was deferred.

Glasgow.—Working Agreement.—As the result of the report submitted by Sir Philip Dawson in connection with the electricity supply for the tramways, the Corporation has instructed the general managers of the Tramways and Electricity Departments to make tentative arrangements for the supply of additional power (8,000 kW) required by the Tramways Department and for the whole Sunday load of the two departments to be supplied entirely from Pinkston and from Dalmarnock power stations alternately, except for the winter months, when the supply will be given from the latter station entirely.

Greenock.—Accident.—An explosion occurred in Main Street on October 16th, caused by an oxygen cylinder which fell from a lorry. A tramcar which was passing was almost wrecked and caught fire, and another car which had just passed the spot was also damaged. A number of passengers received injuries, and the driver of the former car was severely burnt.

Mexico.—Proposed New Railway.—Mr. N. S. Seblich, an electrical engineer of Berlin, is making an investigation of the traffic possibilities of an inter-urban electric railway to run from Mexico City to Cuernavaca, a distance of 75 miles.—*Electric Railway and Tramway Journal.*

Telegraph and Telephone Notes.

Cable Ships.—A New Vessel.—The *Cable*, a new cable-laying ship which will shortly leave the hands of the builders at Glasgow, has been constructed to the order of the Eastern Extension, Australasia and China Telegraph Co.

The "Stephan."—After being away from London for just under a month, the *Stephan* has returned to dock, having laid 1,400 miles of cable, linking the new mid-European system with the United States and South America. The new cable will be partially controlled by the Italian Government, and the portion which has been laid by the *Stephan* is that between the coast of Spain, at Malaga, and Fayal, in the Azores. The vessel, which is now lying in the South West India Dock, was originally the "crack" vessel of the German cable service, and was handed over to the British in 1919, under the Reparations Scheme, and is now under the command of Captain E. F. Carlton, R.N.R.—*Evening News.*

German-American Cable.—Negotiations Completed.—The president of the Commercial Cable Co. announces that negotiations have been completed for a new Transatlantic cable between America and Germany *via* the Azores. The company will be responsible for the laying of the New York-Azores section, while that between the Azores and Emden will be in the hands of the Deutsch Atlantische Telegraphen Gesellschaft, of Berlin. The two cables belonging to this company previous to the war were confiscated by the Allies, one now being operated between Great Britain and Canada as the Imperial Cable, while the other is operated between Brest (France) and St. Pierre (Miquelon) by the French Cable Co. on behalf of the French Government.—*Financial Times.*

Greece.—Private Radio Telephones.—Radio telephony is being used as an aid to the conduct of business by a number of business houses in Greece, where the regulations permit of the private use of this means of communication. Four important firms are equipping their premises with the Marconi "Popular" set (type XP) to link their head offices in Athens with their branch offices in the Piraeus, and further inquiries for similar sets have been received from other commercial firms.

Russia.—Telegraph Convention.—It is reported from Moscow, says *The Times*, that Soviet Russia and Mongolia have signed a postal and telegraph convention.

Wireless Beacons.—Aid to Navigation.—The first experimental radio beacon to be erected on the coast of Great Britain has been installed by the Marconi International Marine Communication Co., Ltd., with the permission of Trinity House, at Nash Point, between Swansea and Cardiff, and has been subjected to severe practical tests over a period of six months with most satisfactory results. The installation consists of a ¼-kW quenched-spark transmitter which automatically transmits its own call sign, GKD, on a wave length of 1,000 metres. It is operated by means of an Austin engine, petrol being used for starting, and the machine automatically switching over to paraffin. The power used is sufficient to enable bearings to be obtained by means of the Marconi marine direction-finder at a distance of 50 miles. The beacon, however, does not interfere with broadcast reception outside a range of three miles from the beacon. This beacon has proved very useful in the Bristol Channel, where the opportunities to make use of a direction-finder are very limited.

Radio Notes.

Educational Broadcasting.—Programmes for Schools.—The British Broadcasting Co. has issued its educational programme for the autumn session. Special transmissions for schools are given from the London station every weekday at 3.15 p.m., and other stations are also developing their own school programmes. A 15-minutes talk at 7.10 p.m. has been planned in series in consultation with the Adult Education Committee, and a similar talk at 9.40 p.m. has been arranged for the general public. There is no diminution of the time hitherto devoted to music, news, &c.—*The Times.*

New Relay Station.—Stoke Station Opened.—On October 21st, the B.B. Co. inaugurated a new relay broadcasting station at Stoke-on-Trent. The call signal is 6ST and the wavelength 306 metres.

New Zealand.—Radio Bill.—The Government has introduced a Bill making all radio broadcasters agents of the Crown, which means, it is understood, that if the Marconi Co. sought to assert any monopoly it would have to deal with the Crown.

The Times reports that Amalgamated Wireless, Australasia, Ltd., recently warned broadcasters to cease operations on the ground that they infringed the company's rights. The Postmaster-General states that broadcasters will be at liberty to resume operations as soon as the Bill is passed.

Northern Ireland.—Belfast Station.—The British Broadcasting Co.'s station at Belfast, the operation of which has so far been of an experimental nature, is to be opened formally to-day, the 24th inst., by the Duke of Abercorn, Governor of Northern Ireland.

Relay Experiment.—FORTHCOMING TESTS.—It is understood that during the week, November 23rd to 30th, from 10.30 to 11.30 p.m., British listeners will be treated by the British Broadcasting Co. to selections from European and (if atmospherics are favourable) United States and Canadian stations. Many American stations will co-operate, and it will be a test of skill for the company to switch rapidly from the low American to the fairly high wave lengths of the Continent.

Contracts Open and Closed.

(The date given in parentheses at the end of the paragraph indicates the issue of the ELECTRICAL REVIEW *in which the "Official Notice" appeared in our advertisement pages.)*

Open.

Australia.—SYDNEY.—January 28th. N.S.W. Government Railways. Two steam turbine-driven boiler feed pumps and two motor-driven ditto. Chief Electrical Engineer, 61, Hunter Street, Sydney.

Municipal Council. November 3rd. Ten h.p. switchboards and ten l.p. switchboards.

MELBOURNE.—November 24th. Electricity Commission of Victoria. 5 miles .15 sq. in. 3-core paper-insulated lead-covered armoured 22,000-V power cable; 5 miles .007 sq. in. 3-core 2 pair paper-insulated lead-covered armoured pilot cable, joint boxes and trifurcating boxes.

Electricity Commission, &c. December 20th. Switchgear and accessories. (See this issue.)

Belgium.—October 29th. Belgian State Railway authorities (Office de l'Electricité), 25, Rue de la Charité, Brussels. Two underground armoured cables at Saint Ghislain, two at Monceau, and two at Mons. Particulars (Cahier des Charges Special No. 4-100)) may be obtained for 1 fr. 15 c.

Carlisle.—October 31st. Board of Guardians. Wiring for electric lighting and power at the Fusehill Institution. (October 17th.)

Croydon. — Electricity Department. Railway siding (400 ft. double track), weighbridge, wagon tippler, and coal-conveying plant. (October 17th.)

Dublin.—November 10th. Great Northern Railway (Ireland). Stores for six months, including electrical fittings, lamps, cable and wire, &c. (See this issue.)

Dundee.—November 17th. Electricity Department. E.h.p. switchgear. (See this issue.)

Egypt.—CAIRO.—November 1st. Director-General, State Dômains Administration (Commercial Service), Savoy House, Cairo. Four semi-Diesel engines and four centrifugal pumps.

KHARTOUM.—October 30th. Inspector-General of Irrigation. Electric lighting set, including engine, dynamo, fittings, fans, lamps, &c., and electric bell system for the Egyptian Irrigation Service steamer *Kassala*. Specifications from the Inspector-General of Irrigation, Khartoum, Sudan.

Edinburgh.—October 27th. Education Authority. Electrician's work at St. John's R.C. School, Portobello. Messrs. Reid & Forbes, architects, 7, Ainslie Place, Edinburgh.

Glasgow.—October 27th. Corporation Labour Department. Works in connection with the widening of Stockwell Street, including electric lifts. Forms from Office of Public Works, City Chambers.

Hale.—November 14th. Urban District Council. Equipment of an air-compressing station at the sewage disposal works. (See this issue.)

Hailsham.—October 29th. Board of Guardians. Electric lighting installation at the Institution, Hellingly. (October 10th.)

India.—November 4th. India Stores Department, Belvedere Road, S.W. Testing motor-alternator sets (22.5 kVA and 10 kVA, 3-phase alternators), complete with controlling switchgear, portable transformers, &c. (October 17th.)

BOMBAY, BARODA AND CENTRAL INDIA RAILWAY CO.—December 15th. Electrification of Bombay suburban lines. Electrical equipment of coaches. (October 10th.)

London.—LONDON COUNTY COUNCIL.—October 27th. H.p. electric cables and withdrawing, repairing, and relaying existing l.p. cables. (October 10th.)

ISLINGTON.—November 5th. Electricity Department. H.p. switchgear. (October 10th.)

PADDINGTON.—November 21st. G.W. Railway Stores for 12 months, including telegraph instruments, electrical apparatus, wires and cables, &c. (October 17th.)

Maidstone.—Electricity Works. Water-softening plant; coal unloading plant, consisting of electric jib crane, automatic weigher, and splash hopper. (October 17th.)

Shrewsbury.—October 29th. Atcham Board of Guardians. Electric lighting plant and X-ray apparatus, Berrington Hospital, Cross Houses. Messrs. Henry Lea & Son, consulting engineers, 1, Newhall Street, Birmingham (returnable deposit of £3 3s.).

South Africa.—BLOEMFONTEIN.—December 1st. Municipal Council. H. and l.p. switchgear, transformers, auxiliary motor switches, &c.; material for interior and exterior power and lighting circuits in the new power station, and boiler-house equipment, piping, pumps, &c.*

JOHANNESBURG.—November 17th. Municipal Council. Electric arc-welding generator set, complete with all accessories.*

SOUTH AFRICAN RAILWAYS AND HARBOURS BOARD.—November 24th. Converter plant, switch cubicles, transformers, and motors.*

CAPE TOWN.—November 18th. City Council. Electric motors.*

GEORGE, CAPE PROVINCE.—December 21st. Municipal Council. Establishment of an electric lighting and power undertaking for the Council, including erection of power station and supply of necessary plant, &c.—*South African Mining and Engineering Journal.*

Stainforth.—November 18th. Education Department. Electric lighting installation at the new school. The secretary, Education Department, County Hall, Wakefield.

St. Osyth.—October 31st. Parish Council. Electric lighting installation, including maintenance, &c. (See this issue.)

Switzerland.—LAUSANNE.—December 1st. Federal State Railway. Electrically-operated signalling and railway point control installation at the railway station at Thoune. Particulars for 15 fr. from Bureau, No. 51, S.B.B. Verwaltungsgebaudes, 1, Razude, Lausanne.

Thorpe (Norwich).—November 4th. St. Andrew's Hospital. Lagging of steam pipes and vessels. (October 10th.)

*Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Closed.

Australia.—Postmaster-General's Department, Victoria.

Telephone cords (£1,116).—Phœnix Telephone and Electric Works, Ltd.
Material for Hawthorn telephone exchange (£1,091). Bells, cords, and plugs (£1,778).—British L. M. Ericsson Mfg. Co., Ltd.
Telephone parts (£1,842). Bells, cords, and plugs (£232). Material for Hawthorn exchange (£2,674).—British General Electric Co., Ltd.

QUEENSLAND.—Postmaster-General's Department.

Two automatic switchboards, with associated apparatus, including equipment for use at subscribers' premises (£61,850).—Siemens Bros. and Co., Ltd.

MELBOURNE.—Victorian Railways.

Air compressors (£1,643 each); electrical equipments (£1,807 each).—Price, Martyn & Co.
Track transformers (£4 2s. 6d. each).—E. M. F. Electric Co. Pty., Ltd.
Single-phase transformers (£1,945).—British Electric Transformer Co., Ltd.

VICTORIA.—State Coal Mine.

Two motors and spares (£385).—Metropolitan-Vickers Electrical Co., Ltd.

State Electricity Commission.

Insulators.—Drayton Bros.; Australian Porcelain Co. Pty., Ltd.
Disconnecting switches (£1,296).—Electrical Equipment Manufacturers Pty., Ltd. —*TENDERS*

Ayr.—Town Council. Accepted:—

Two tramway cross-overs (£646).—Titan Trackwork Co., Ltd.

Carlisle.—Electricity Committee. Accepted:—

Boiler-house equipment (£2,544).—Stirling Boiler Co., Ltd.

Cheadle and Gatley.—Urban Council. Accepted:—

Switchgear for three sub-stations (£3,089).—Metropolitan-Vickers Electrical Co., Ltd.

Dublin.—Commissioners for the County Borough. For the supply of electricity meters for the Electricity Department for 12 months, 18 tenders were received—seven British, six German, two Swiss, and one each Dutch, Danish, and Italian. The following are recommended:—

Single-phase and 3-phase meters.—Dr. Paul Meyer, A.G.
Slot meters.—Siemens-Schuckert.—*Irish Builder and Engineer.*

Forehoe (Norfolk).—Board of Guardians. Accepted:—

Electric lighting installation at Wicklewood Workhouse.—P. R. Andrews (£555).

Glasgow.—The Tramways Committee recommends that an order for special steel track work be given to an American firm. Their offer for the work amounted to £8,000, and was less by £800 than the lowest British offer.

Government Contracts.—The following Government contracts were placed during September, 1924:—

ADMIRALTY CONTRACT AND PURCHASE DEPARTMENT.

Alternators, motors and spare parts.—Crompton & Co., Ltd.
Cells.—Fuller's United Electric Works, Ltd.; Premier Accumulator Co. (1921), Ltd.; Edison Swan Electric Co., Ltd.; London Battery & Cable Co., Ltd.
Galvanised conduit.—General Electric Co., Ltd.
Diesel-driven generating sets.—W. H. Allen, Sons & Co., Ltd.
Spare parts for heating equipment.—Credenda Conduits Co., Ltd.
Motor-generators, starters and spare parts.—Small Electric Motors, Ltd.
W/T. apparatus (aerial, &c., coils, resistances, &c.).—H. W. Sullivan, Ltd.
W/T. apparatus (heterodyne units).—H. W. Sullivan, Ltd.

WAR OFFICE.

Generating sets.—Campbell Gas Engine Co., Ltd.
Aluminium ingots.—British Aluminium Co., Ltd.
Copper sheet.—British Insulated & Helsby Cables, Ltd.

Air Ministry.

A.V. magneto spares.—British Thomson-Houston Co., Ltd.
Cable and boxes.—Netheravon & Upavon: W. T. Glover & Co., Ltd.
Electric dynamometer.—W. Skidmore.
H.p. switchboards.—General Electric Co., Ltd.

Post Office.

Balancing cable.—Bristol-Bath-Bathford: Pirelli-General Cable Works, Ltd.
Manufacture, supply, drawing-in, and jointing cable.—Atherton-Wigan: W. T. Glover & Co., Ltd. London-Stanmore Hill: Pirelli-General Cable Works, Ltd.
Electric passenger lifts.—(G.P.O. South), J. Bennie, Ltd.; (Bishopsgate telephone exchange), W. Wadsworth, Ltd.
Telephone exchange equipment.—Smith & Godlie (Manchester), G.W.R. (W. Smithfield goods depôt): Relay Automatic Telephone Co., Ltd. Bristol, Guildford, Redditch: General Electric Co., Ltd.; sub-contractors for batteries: D. P. Battery Co., Ltd.; for charging machines: Crompton & Co., Ltd. Bishopsgate: Automatic Telephone Manufacturing Co., Ltd.; sub-contractors for batteries: Chloride Electrical Storage Co., Ltd.; for charging machines: Newton Bros. (Derby), Ltd. Leeds area: Automatic Telephone Manufacturing Co., Ltd. Canterbury: British L.M. Ericsson Manufacturing Co., Ltd.
Telephone repeater station, power plant.—Western Electric Co., Ltd.
Rugby wireless station, motor-generators.—Newton Bros. (Derby), Ltd.
Rugby wireless station, steel towers.—Head, Wrightson & Co., Ltd.
Telephone apparatus.—Automatic Telephone Manufacturing Co., Ltd.; British L.M. Ericsson Manufacturing Co., Ltd.; British Insulated and Helsby Cables, Ltd.; General Electric Co., Ltd.; India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.; International Electric Co., Ltd.; Phœnix Telephone & Electric Works, Ltd.; Siemens Bros. and Co., Ltd.; Sterling Telephone & Electric Co., Ltd.; Western Electric Co., Ltd.
Testing apparatus.—Chamberlain & Hookham, Ltd.
Wireless apparatus.—Bullers, Ltd.
Cable.—British Insulated & Helsby Cables, Ltd.; Callender's Cable and Construction Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.; Johnson & Phillips, Ltd.; Pirelli-General Cable Works, Ltd.; Siemens Bros. & Co., Ltd.; Union Cable Co., Ltd.; Western Electric Co., Ltd.
Joint box castings.—Ladywood Ironworks, Ltd.
Secondary cells.—Alton Battery Co., Ltd.; Hart Accumulator Co., Ltd.; Premier Accumulator Co. (1921), Ltd.; Pritchett & Gold & E.P.S. Co., Ltd.; Tudor Accumulator Co., Ltd.
Loading coils.—Western Electric Co., Ltd
Cable drums.—Eames Bros.
Ducts.—Albion Clay Co., Ltd.; Hepworth Iron Co., Ltd.; J. Oakes and Co., Ltd.; Oates & Green, Ltd.; Standard Brick & Terra Cotta Co., Ltd.
Insulators.—Bullers, Ltd.; T. De la Rue & Co., Ltd.; Doulton & Co., Ltd.; Electric & Ordnance Accessories Co., Ltd.; Lithonite Insulators, Ltd.; J. Macintyre & Co., Ltd.; Taylor, Tunnicliff & Co., Ltd.
Pumps.—Rees Roturbo Manufacturing Co., Ltd.
Wallboards.—J. W. Thompson, Ltd.
Copper wire.—T. Bolton & Sons, Ltd.; British Insulated & Helsby Cables, Ltd.; Enfield Cable Works, Ltd.; R. Johnson & Nephew, Ltd.; Johnson, Clapham & Morris, Ltd.; Pirelli-General Cable Works, Ltd.; Shropshire Iron Co., Ltd.; F. Smith & Co.; J. Wilkes, Son and Mapplebeck, Ltd.
Bronze wire.—T. Bolton & Sons, Ltd.; British Insulated & Helsby Cables, Ltd.; R. Johnson & Nephew, Ltd.; Shropshire Iron Co., Ltd.; F. Smith & Co.

H.M. Office of Works

Engineering services, wiring Royal College of Art, South Kensington, S.W.—T. Clarke & Co., Ltd.
Motor-alternator set, National Physical Laboratory, Teddington.—Mather and Platt, Ltd.

Crown Agents for the Colonies.

Cable, &c.—Callender's Cable & Construction Co., Ltd.; British Insulated and Helsby Cables, Ltd.; Siemens Bros. & Co., Ltd.
Copper wire, &c.—F. Smith & Co.

London.—Hackney.—Electricity Committee. Extension of distributing mains and conversion from gas to electricity in streets at present lighted by the former method.

Cables.—British Insulated & Helsby Cables, Ltd.
Time switches.—Horstmann Gear Co., Ltd.
Reflectors.—Elm Works, Ltd.

Metropolitan Asylums Board.—Works Committee.

Internal automatic telephone system, Leavesden Mental Hospital:—

V. G. Middleton & Co., Ltd.	£1,657
Coley & Swinnerton, Ltd.	1,700
W. H. Agar	1,750
T. Clarke & Co., Ltd.	1,762
Manley & Regulus, Ltd.	3,100

Installation of a c.b. telephone system, Brook Hospital:—

Myall Bros. (Recommended.)	**£935**
W. H. Agar	991
T. Clarke & Co., Ltd.	1,100
V. G. Middleton & Co., Ltd.	1,298
Coley & Swinnerton, Ltd.	1,345
W. C. Davey & Co.	1,347
Riddle & Goddard, Ltd.	1,359
Belshaw & Co.	1,486
Manley & Regulus, Ltd.	2,550

London County Council.—Stores and Contracts Committee. Contracts accepted during the three months ended September 30th, 1924:—

Electric insulating materials.—Attwater & Sons; British Electrical and Manufacturing Co., Ltd.; Dacier, Ltd.; Hamnett & Andrew; J. North, Hardy & Son, Ltd.; Ioco Rubber and Waterproofing Co., Ltd.; A. A. Sample; Siemens Bros. & Co., Ltd.
Electrical fittings.—Baxter & Caunter, Ltd.; British Central Electrical Co., Ltd.; British Insulated & Helsby Cables, Ltd.; Edison Swan Electric Co., Ltd.; General Electric Co., Ltd.; G. S. Peckham & Co. Simplex Conduits, Ltd.; Tok Switches, Ltd.

Fulham.—Electricity and Lighting Committee. Recommended:—

Erection of two new coal bunkers, to facilitate a uniform method of coal handling (£2,849).—Vickers, Ltd.

New Zealand.—Auckland Power Board.

100,000 yd. bare copper cable (£1,898).—Lawrence & Hanson Electric Co., Ltd.
40,000 yd. triple-braided cable (£3,708).—Tolly & Sons, Ltd.

Christchurch.—City Council.

House-service meters (£4,553); 54 current transformers (£200).—Metropolitan-Vickers Electrical Co., Ltd. —*TENDERS*

Radcliffe (Lancs.).—District Council. Accepted:—

Electric arc-welding plant, E.L.I. type (£297).—Equipment and Engineering Co.

Walsall.—Town Council. Accepted:—

Structural steelwork, foundations, &c., for new boilers and ash conveyors at Birchills generating station (£1,903).—Babcock & Wilcox, Ltd.

Forthcoming Events.

Institution of Electrical Engineers (North-Eastern Centre).—Monday, October 27th. At Armstrong College, Newcastle-on-Tyne. At 7.15 p.m. Chairman's (Mr. W. T. Maccall) address.

(North-Western Centre Students' Section).—Tuesday, October 28th. At Milton Hall, Deansgate, Manchester. At 7.30 p.m. Lecture on "Modern Transformer Practice," by Mr. A. G. Ellis.

Institution of Electrical Engineers.—Informal Meeting.—Monday, October 27th. At the Institution, Victoria Embankment, W.C. At 7 p.m. Discussion on "The Interconnection of Power Stations," to be opened by the president, Mr. W. B. Woodhouse.

Nottingham Society of Engineers.—Monday, October 27th. At the Victoria Station Hotel, Nottingham. At 7.30 p.m. Paper on "Pulverised Fuel and its Application to Boiler Firing," by Mr. W. J. Cotterell.

Paisley Association of Electrical Engineers.—Tuesday, October 28th. At 16, High Street, Paisley. At 7.30 p.m. Paper on "Development of the Use of Electricity in the Navy," by Engr. Rear Admiral W. Whitingham.

Institution of Civil Engineers.—Tuesday, October 28th. At the Institution, Great George Street, S.W. At 6 p.m. Address on "The Economic Position of Great Britain," by Mr. E. Crammond.

Institute of Physics.—Wednesday, October 29th. At the Institution of Electrical Engineers, Victoria Embankment, W.C. At 5.30 p.m. Lecture on "Electrical Precipitation," by Sir Oliver Lodge, F.R.S.

Institution of Mechanical Engineers.—Friday, October 31st. At the Institution, Storey's Gate, S.W. At 7 p.m. Discussion on "Engineering Novelties at the British Empire Exhibition."

Faraday House Old Students' Association.—Friday, October 31st. At the Hotel Cecil. Annual dinner.

Institute of Marine Engineers.—Friday, October 31st. At the Hotel Cecil. At 6.30 p.m. Annual dinner.

Junior Institution of Engineers.—Friday, October 31st. At 39, Victoria Street, S.W. At 7.30 p.m. Lecturette, "Audio Frequency Transformers," by Mr. H. J. N. Riddle.

Notes.

Fatalities.—Frederick Oliver Sheasby, who, as recorded in our last issue, received a severe electrical shock while engaged at the works of Messrs. Williams Bros. & Piggott, Small Heath, Birmingham, subsequently succumbed to his injuries, and an inquest was held on October 16th. The plant upon which the deceased was working consisted of four iron switch chambers, and an examination after the accident showed that in one of the chambers the three leads were burned right through just below the oil tank of the switch. A witness said that the deceased man was standing by the panel, the shutter of which was partly open, when he must have placed his hand inside, for one or two explosions occurred. Before his death Sheasby stated that he had touched an insufficiently insulated bar. The Coroner returned a verdict of "Accidental death."

At the Phœnix Works, Bradford, of the English Electric Co., Ltd., on October 17th, Charles Darnborough (48), of Eccleshill, was struck in the chest by a portion of machinery and so seriously injured that he died before reaching the Infirmary.

Muscle Shoals.—It is reported that Mr. Henry Ford has withdrawn his offer to purchase Muscle Shoals for hydro-electric development.—*Reuter.*

The Italian Electrical Industry.—A congress of representatives of electrical undertakings in Italy was held in Turin in the first week in October, when the president (Signor Ponti) presented statistics showing the development of the supply industry. It appears that the capacity of the plant installed in generating stations, which amounted to 87,000 kW in 1898, had risen to 426,000 kW in 1908 and to 1,240,000 kW in 1918, while the total is expected to reach 2,341,000 kW in 1928. Concerning the consumption it was mentioned that this was 2,300 million kWh in 1915, 4,120 millions in 1918, and 5,500 millions at the beginning of the present year. The total capital invested in the supply industry, which amounted to 200,000,000 lire in 1898, is now 3,000,000,000 lire. After the submission of a paper dealing with the policy of the Government with regard to the exploitation of water power, it was stated that the subsidy of 40 lire per h.p. which had been promised by the State had never been paid.

Appointments Vacant.—Relief shift engineer for Beckenham Urban District Council Electricity Department. Meter fixer and reader for Hackney Borough Council Electricity Department. Assistant to the distribution engineer for the Woolwich Corporation Electricity Department. (See our advertisement pages to-day.)

A New Use for Direction Finders.—The use of directional radio communication is constantly extending, and it is now being applied to the special requirements of vessels engaged in whaling operations. The *Sir James Clark Ross*, which recently sailed from Cardiff for the Ross Sea, has been fitted with a Marconi direction-finder, and is taking with her five others for use on board the small boats associated with her. The large vessel is fitted with a Marconi 3-kW telegraph-telephone transmitter, which enables her to give instructions to the small boats' crews, as it not infrequently happens that they are overtaken by fog or darkness, and have difficulty in finding their way back to the parent ship.

American Electric Vehicle Exports.—That a quiet tone exists as regards the foreign trade in American electric vehicles may be judged from the fact that only six, valued at $8,660, were exported from the United States during July last, as contrasted with 35 ($45,881) in the same month a year ago.

The Electro-Harmonic Society.—On Friday last the annual meeting of the Society was held at the Institution of Electrical Engineers. Mr. J. E. Kingsbury presided, and after the accounts had been approved introduced the resolution for the suspension of the activities of the Society with a brief account of the early days when music-loving electrical engineers gathered together in the St. James's Hall to enjoy their favourite recreation. Reviewing the career of the Society and the changes which had occurred in its membership and habitat, the chairman explained the circumstances which had compelled the Executive Committee to arrive at the conclusions embodied in the resolution.

A discussion followed, in the course of which various propositions were put forward with a view to retaining the Society in existence or so modifying its policy as to secure for it renewed support and to launch it upon a new career of usefulness. The principal obstacle, however, by general agreement, was the difficulty, at present insuperable, of obtaining a suitable hall for the concerts. Eventually the resolution was passed unanimously, but the Committee was re-elected *en bloc*, and it was understood that it would take action towards restoring the Society to full activity directly the circumstances were found to be more favourable. A hearty vote of thanks, moved by Sir George Sutton and seconded by Mr. Kingsbury, was awarded to the Committee, and especially to the hon. secretary, Mr. W. E. Lane, for their untiring labours on behalf of the Society, and the proceedings closed with a vote of thanks to the chairman.

Should any member become aware of the availability of a suitable concert room, or have suggestions to offer, the Committee will be glad to hear from him.

London Electrical Engineers.—We learn that the 27th Anti-Aircraft Battalion, R.E. (London Electrical Engineers) had a most enjoyable (and, let us hope, instructive) camp at Hunstanton this summer. The work of this unit, which is commanded by Lt.-Col. K. Edgcumbe, is most interesting as well as useful, consisting in the operation of anti-aircraft searchlights in the London area, and the localisation of aircraft by means of sound. The searchlights are driven either by petrol-electric lorries, or by fixed petrol-driven sets, and the sound localisation is carried out by means of special trumpet-pattern sound locators, the operation of which depends upon the accuracy with which the human ear can detect even a minute phase displacement between the waves of sound reaching the two ears.

A Human Race.

Localising Aeroplanes by Sound.

The accompanying photographs show some members of the Unit at work and at play, the occasion of the latter being the battalion sports at Hunstanton.

Any electrical men with a predilection for a free holiday by the sea and an interesting job should get into touch with the London Electrical Engineers, whose headquarters are at 46, Regency Street, Westminster.

Cheap Electricity.—The Hydro-Electric Power Commission of Ontario, Canada, has about 320,000 customers, and Sir Adam Beck, the chairman, in a recent statement, says that the average family in Ontario obtains all the advantages of electric light for four shillings a month.

Accident.—Whilst engaged on the dismantling of a high-pressure switchboard at the Belfast Corporation electric power station, East Bridge Street, recently, William Erskine received a severe shock and sustained burns upon his hands and face. A fellow-worker rendered first-aid and accompanied the injured man in the ambulance to the hospital. A few hours later while the other man was employed at the same switchboard he also sustained a severe shock, which necessitated his removal to hospital, but after a few hours he was allowed to return home.

Pan-American Standardisation Conference.—The first Pan-American Standardisation Conference, to consider specifications and uniform nomenclature for raw materials, supplies, tools, machinery, equipment, and other merchandise, will be held at Lima, Peru, beginning on December 23rd.—*Reuter's Trade Service* (Washington).

R.N.D. Dinner.—The sixth annual dinner of the R.N.D. Signal Company will be held at the Engineers' Club, London, on November 8th at 6.45 p.m. Mr. R. M. Clark will take the chair. Morning dress will be worn, and tickets (7s. 6d.) may be obtained from Mr. J. N. Robertson, 14, Woodgrange Avenue, Ealing, W.5.

The Design of Surge Tanks.—In a paper on "The Investigation of the Surge-Tank Problem by Model Experiments," by Prof. A. H. Gibson, D.Sc., which is to be brought forward for discussion at the Institution of Civil Engineers, the author states that the problem of determining the rise and fall of level in a surge-tank, and the period of oscillation of the water-column, is not readily susceptible to mathematical treatment. In the case of a simple layout, a solution may be obtained by a process of arithmetical integration dealing with the cycle in a series of short stages, during each of which the acceleration may be assumed to be uniform. The process is, however, tedious, and in a complicated layout all but impracticable. The problem would appear to be well adapted for examination by the use of a suitable small-scale model. In the paper the conditions necessary in order that the behaviour of such a model should give a true representation of that of its large-scale prototype are discussed, and a description is given of an experimental plant erected in the hydraulic laboratories of the Manchester University for the purpose of investigating such problems.

A large number of tests have been made on this plant, which has been adjusted so as to represent a wide range of possible full-size installations. In each case the behaviour of the installation has been examined by the process of arithmetical integration, and the results of the model tests and of those obtained in this manner are compared in a number of typical cases. As indicated by these examples, the results of the tests, when interpreted according to the laws of dynamical similarity, are in every case in close agreement with the results as calculated for the corresponding large pipe-line and surge-tank. Any dimensional effect is so small that the error involved in determinations of the height of the maximum or minimum surge following a sudden closure or opening of the outlet-valve does not exceed 1 or 2 per cent., while the calculated and observed periods of oscillation of the surges are also in very close agreement. The experiments indicate that the results of tests on such a model may be used with confidence to predict the behaviour of the surge-column in any projected installation, however large, or of however complicated a nature.

Wembley Engineering Exhibitors' Dinner.—A dinner arranged by the Engineering Exhibitors will be held at the Hotel Cecil on Tuesday, October 28th. Sir Robert Horne, who had undertaken to preside, will be prevented from doing so owing to pressure of election work and Air Vice-Marshal Sir W. Sefton Brancker, K.C.B., A.F.C., has kindly consented to act as chairman. While all arrangements are now virtually completed a few tickets (price 10s. 6d.) may still be had if early application is made to Mr. B. Lock, c/o Port of London Authority, Avenue 5, Palace of Engineering, Wembley.

An Electrical Service Restaurant.—A very up-to-date restaurant has been discovered by *Electrical Merchandising* in Detroit. By means of electricity, an entire meal can be served in this restaurant without having a waiter in sight or without grudgingly leaving a tip to an unobliging waiter. The principle of operation is similar to that of the dumbwaiter or elevator. The guest enters the restaurant, selects his table, notes on the menu the food he requires, drops the menu through a slot in the table and waits a minute or two. Presently there is a little humming noise, and lo! in the centre of the table, on a four-poster tray, appears the food he has just ordered. When the menu is slipped into the slot it drops to the kitchen below; the server there immediately fills the order, presses a button, and the food is on its way to the table. When the guest has finished his meal he takes the bill, which has also been delivered by electricity, pays it at the usual cashier's stand, and leaves the restaurant with a feeling of ease and well-being, something he has never experienced, he reflects, after dining in a bedlam of scraping chairs and rushing waiters.

Reports on Lightning.—Mr. Killingworth Hedges, in his letter on "Lightning and Radio Receivers" in our issue of September 19th, asked observers to send him particulars of damage by lightning, especially in the case of buildings fitted with conductors or aerials, he being the Lightning Research Editor for the Institution of Electrical Engineers. Such reports may be addressed to him at St. Stephen's Club, Westminster, S.W.1.

Report on Railway Accident.—Major G. L. Hall has reported to the Ministry of Transport upon a collision between an excursion train and a light engine which occurred at Lime Street Station, Liverpool, on July 25th last. There were no fatalities, but eighteen passengers were slightly injured or shaken. The excursion train was running into the station, and the driver did not notice until it was too late that the light engine was standing on the line. He applied his vacuum brake, but was unable to pull up in time. While placing part of the responsibility upon a signalman, Major Hall says that track-circuiting would have acted as a safeguard. Lime Street Station should certainly be so equipped, and he thinks that this will probably be considered in connection with the alterations which are being made at the station.

Educational. — University College, London. — Professor J. A. Fleming, D.Sc., F.R.S., is to deliver a course of six lectures on "High Frequency Electric Measurements" at the College on consecutive Wednesdays commencing on October 29th. The fee for the course is one and a half guineas and tickets may be obtained from Mr. W. W. Seton, M.A., at the College, Gower Street, W.C.1.

The "Ferrantians."—In November, 1912, there was held in London a reunion of "Old Ferrantians," that is, those engineers who were associated with the pioneer work of Dr. S. Z. de Ferranti. It was hoped at that time that those engineers would meet every year, but the war intervened and nothing has since been done. It is now felt that there should be another reunion, and it is hoped to hold this early in December at the Hotel Cecil in the form of a dinner, at which it is expected Mr. C. H. Wordingham, C.B.E., will preside. Those of our readers who were connected with Dr. Ferranti prior to 1905 are requested to communicate with the hon. secretary, Mr. W. E. Warrilow, 40, Mildred Avenue, Watford.

Speech Amplifiers.—It is proposed that loud speakers, costing £250, should be installed by the Corporation in the Caird Hall at Dundee.

Haymaking Without Sunshine.—According to the daily Press, the Institute of Agricultural Engineering at Oxford has been carrying on researches in connection with the drying of crops of hay and corn by means of a current of hot air, and a demonstration of the process was given at the University Farm at Sandford on Tuesday last week. The *Morning Post* states that the principle of the process is the driving by a fan of air, heated by paraffin fuel, into a central chamber of a hay or corn rick, the air radiating from the chamber to every part of the rick and completely drying the crop, in the case of a rick of from 20 to 25 tons, in rather more than eight hours. In the finished dry stack is found the original crop deprived entirely of the moisture present at the time of carting, and it is claimed that the rapid removal of the moisture prevents any chemical changes from occurring and thus avoids the loss of any nutriment. Experiment has shown, also, that crops artificially dried are no less palatable than those dried by sun and air at normal temperature.

The plant needed does not involve a heavy outlay, £50 being sufficient to provide the heater, the duct conveying the hot air, and the fan, which is driven by the ordinary farm tractor. As to the cost, experimental working points to total expenses in a good season of 11s. 6d. per ton of hay, as compared with 13s. 6d. by the natural method. In a bad season the cost of the artificial method is still estimated at 11s. 6d. per ton as against 18s. for making the hay by the usual methods. As regards corn, the cost of drying runs from 1s. 6d. to 2s. per ton. It is claimed that the method will permit the harvesting of crops quite independently of weather conditions, will eliminate all labour for making hay and stooking corn, and will enable ploughing to proceed earlier owing to the land being quickly cleared.

It will be remembered that in a paper read before the Institution of Electrical Engineers in 1922 (Elec. Rev., April, 1922), Mr. R. Borlase Matthews described the method, of which he was the inventor, of drying crops with a current of air set up by a fan. Since that date further particulars of the method have been given in our pages from time to time.

Mechanical Bank Clerk.—It is reported that one of the large banks proposes to use machines for ledger-posting and writing-up pass-books. Such a machine has been used at Lloyds Bank branch at the British Empire Exhibition at Wembley and has given satisfaction. In the United States and in Canada thousands of these machines are in use. One has 176 keys, like those of a typewriter, is worked by electricity, and, it is claimed, can be operated by any man or woman of medium intelligence after 10 minutes' practice. Instead of a pass-book the customer receives a typed "statement" showing debits and credits and the current balance. The operator, after entering debits and credits, presses a key marked "Total," when the balance appears. If, however, the customer's account is overdrawn the machine refuses to act.

Local Societies.—Mining Engineers.—At the opening meeting of the West of Scotland Branch of the Association of Mining Electrical Engineers, in Glasgow, Mr. D. T. H. McQueen delivered the presidential address. He dealt with unemployment, pleading for unity and the sinking of all party or professional jealousy in administration.

Edinburgh Electrical Society.—To-night Mr. C. Norman Kempe, B.Sc., will deliver a lecture on "X-rays and their Technical Applications Illustrated." On November 7th Mr. G. Henderson will introduce "Alternating Current Motors," and on November 21st "Tariffs and Consumers" will be the subject of a paper by Mr. W. Duncan.

French Trials of Battery Vehicles.—The French Minister of Public Works inaugurated at the beginning of this month at Bellevue, where trials also took place last year, a series of trials with electric battery vehicles, of which 16 have been entered. Several firms which construct petrol-driven cars are participating in this year's tests; for instance, the Automobiles Berliet, the Automobiles de Dion-Bouton, the Automobiles Renault, the Etablissements Laporte, the Société Krieger, the Société A.E.M. and Traction Electrique. Four of the vehicles entered are equipped with alkaline accumulators and 12 with lead batteries, and the vehicles submitted by the before-mentioned companies have 11 batteries of the Tudor type installed on their vehicles.

Institution Notes.

Institution of Electrical Engineers.—Wireless Section.—On November 5th, Mr. E. H. Shaughnessy, O.B.E., the chairman of the Section, will deliver his address. On December 5th Mr. G. Shearing, B.Sc., will read a paper on "Wireless Telegraphy Valve Transmitters employing Rectified Alternating Current." The meetings of the Sections take place on Wednesdays at 6 p.m.

(Informal Meetings).—The following discussions have been arranged for (Mondays at 7 p.m.):—

October 27th.—"Interconnection of Power Stations"; opener, Mr. W. B. Woodhouse (president).

November 10th.—"Research in the Cable Industry"; opener, Mr. P. Dunsheath, O.B.E.

November 24th.—"Electrostatic Wattmeter Used for Measuring Dielectric Losses in Cables"; opener, Mr. N. A. Allen.

December 8th.—"Pretoria Power Station"; opener, Mr. G. M. Clark.

January 12th, 1925.—"Telephonic Development in Great Britain and in the United States"; opener, Mr. W. Day.

East Midland Sub-Centre.—On October 7th the opening meeting of the session was held at Loughborough College. The chair was handed over to the new chairman (Mr. T. R. Smith, of Leicester), by the retiring chairman, Mr. E. G. Phillips, of Nottingham, and the subject of his address was Leicester "Central" Generating Station, which was designed with an ultimate plant capacity of 65,000 kW, of which 20,000 kW was at present installed. Mr. Smith said that it was necessary to consider the claims of low-temperature carbonisation with by-product recovery, of pulverised fuel, and of mechanical stokers, and in his opinion the choice lay between the two last mentioned; if pulverised fuel plant was of a satisfactory cost it would undoubtedly oust the stoker.

North-Western Centre Students' Section.—The first meeting of this Section for the session is to be held on October 28th, when Mr. A. G. Ellis, M.I.E.E. (Sen. Vice-Chairman of the Centre), will deliver an address on "Modern Transformer Practice." The next meeting takes place on November 11th, when Mr. A. Tustin will introduce "Economics and Industrial Electrification."

Institution of Mechanical Engineers.—Bradford Visit.—The Yorkshire branch of the Institution opened its 1924-25 session on October 17th by a visit to the Phœnix Works, Bradford, of the English Electric Co., Ltd., where the large party was conducted round the works and entertained to tea. In the evening there was a meeting at the Technical College, under the presidency of Prof. Charnock, when Mr. W. S. Burge and Mr. P. J. Chittenden, of London, submitted a joint paper on "Reducing or 'Pass-Out' Steam Turbines." The authors declared that where a large quantity of low-pressure steam was required for heating or process work as well as electric power for driving the plant much greater efficiency was obtained by using high-pressure steam for generating the electric power through the medium of a turbine, and at a certain selected point in the turbine abstracting the steam at the low pressure required for process work. The lecture was illustrated with lantern slides.

Institution of Mining Engineers.—Scholarship.—The Institution has published regulations concerning the "Mavor and Coulson" travelling scholarship, of a sum of £250 for one year, with an additional £50 if America is included in the itinerary. Candidates for the scholarship must be between the ages of 21 and 26, and graduates, or the holders of the Associateship of the Royal School of Mines; they must have had at least twelve months' underground experience and are required to submit theses on subjects connected with mining. The successful candidate will be required to prepare monthly reports and a final report summarising the former.

Junior Institution of Engineers.—Trick Experiments.—On October 17th, with Mr. R. P. Howgrave Graham as the "magician," an electric current of not much more than ½ kW was increased in voltage and frequency to a very high figure

and made to perform many interesting tricks. Thus, it lit a 100-volt lamp with three feet of aluminium shorting its terminals and with 20,000 volts across them. Another lamp coupled with a transformer and a sheet of tinned iron was carried about with no apparent connection to the source of supply, and yet induction was sufficiently great to light the lamp to full brilliance. Other experiments dealt with brush and spark discharges through air and through different materials, such as wood, or the branch of a shrub, and also through Geissler and Crookes tubes; the different colours produced were very effective. The final experiment was simple, but the result extraordinary; the lecturer rubbed a static conductor on his head, touched his watch with it and at the same moment a bell rang several feet away. The experiments made one think that the problems of transmitting energy through the air or ether had been all solved, and certainly energy can be transmitted over relatively large gaps at a not inconsiderable efficiency, but that is the present limit. The spectacle of Mr. Howgrave Graham with a glowing halo round his head, or with sparks flying out of his finger tips, will not readily be forgotten by those who attended his demonstration.

Societe des Ingenieurs Civils de France (British Section).—On Tuesday, October 14th, Mr. de Boulongne, engineer-in-chief of roads and bridges, read a paper on the repairing of the cast-iron railway viaduct over the River Rhone at La Voulte, which was built in 1861, and had developed serious defects. The repairs were effected mainly with reinforced concrete, but arc welding was employed with satisfactory results for repairing the cast-iron uprights of the hand railing, increasing the height of the railing, and welding up the cracks in the cast-iron members of the viaduct. The work was done very economically and with complete success, and the railway company is employing similar methods on a cast-iron bridge over the Rhone at Chasse, which was built in 1851; here still greater use of arc welding is being made. The feature of special interest is that arc welding is not considered well adapted for dealing with cast-iron, but in this case the results have been very satisfactory.

Institute of Physics.—The seventh public lecture of a series on Physics in Industry will be on "Electrical Precipitation," and will be delivered by Sir Oliver Lodge on Wednesday, October 29th, at 5.30 p.m., at the Institution of Electrical Engineers, Victoria Embankment, London. The chair will be taken by Sir Charles Parsons, President of the Institute.

A Women's Electrical Association.—The Women's Engineering Society announces that in connection with the work of the Women's Electrical Committee, a drawing room meeting will be held at Lady Parsons's house, 1, Upper Brook Street, W., on November 12th, at 4.30 p.m., to discuss the formation of a Women's Electrical Association. A paper will be read by Mrs. Matthews (Grad. I.E.E.), on the need of interesting women in electrical development, followed by a short speech by Miss Beatrice Irwin on electrical development in America. Representatives of various women's organisations, together with other representative people in the electrical world, will be present.

Our Personal Column.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Mr. W. PRESTON, proprietor of the firm of William Sanders and Co., of Falcon Electrical Works, Wednesbury, has been nominated as Unionist candidate for Walsall.

Alderman J. B. BURMAN, who is again a candidate for the Duddeston Division of Birmingham, is still a member of the Birmingham Corporation Electricity Committee, and until recently was chairman of it.

Mr. P. J. PYBUS, managing director of the English Electric Co., Ltd., in conducting his campaign as Liberal candidate for the Shipley Parliamentary Division, has had his motor-car fitted up with loud speakers.

Mr. G. C. MOTWANE, director of the Eastern Electric and Trading Co., electrical engineers and contractors, of Bombay, and a number of other leading Indian cities, is on a visit to this country. His object is to obtain the representation of British electrical manufacturers for the supply of all classes of electrical goods which, he says, enjoy an excellent character in India. He is returning to India shortly, his address meanwhile being 8, Mecklenburg Square, W.1.

Mr. CHARLES FISK, at present on the staff of the Norwich Corporation Electricity Department, has been appointed chief clerk to the Jersey Electric Lighting & Power Co., Ltd., Channel Islands.

Mr. E. JORDAN, of Aylesbury, has been appointed resident electrical engineer to the Harwich Town Council, at £400 per annum.

Aylesbury Town Council has appointed Mr. R. E. LIVESLEY, B.Sc., A.M.I.E.E., shift engineer at the Birmingham Corporation electricity works, to succeed Mr. E. Jordan, who has been appointed chief electrical engineer to the Borough of Harwich.

Mr. W. TOLME MACCALL, M.Sc., M.I.E.E., head of the Electrical Engineering Department at the Technical College, Sunderland, is the new chairman of the North-East Centre of the Institution of Electrical Engineers, and he will deliver his inaugural address on Monday next, October 27th. Mr. Maccall was born at Manchester in 1878. At Owens College, Manchester, he obtained the B.Sc. with first-class honours in engineering, and a scholarship of the Victoria University. This was followed by a year's post-graduate work in electrotechnics. Subsequently he had industrial experience with Messrs. W. T. Glover & Co., Ltd., and Messrs. Mather & Platt, Ltd. He was also at the central power station at Woolwich Arsenal, and in the Electrical Testing Department of the Manchester Corporation. Mr. Maccall has had full-time teaching experience at the Owens College, Manchester; the Woolwich Polytechnic; the Halifax Municipal Technical College, as head of the Electrical Engineering and Physics Department; and since October, 1909, he has been head of the Electrical Engineering Department at Sunderland Technical College, as already mentioned. He is a past president of the Sunderland Wireless and Scientific Society and a past-chairman of the North-East Branch of the Association of Teachers in Technical Institutions. His travels have included visits to South Africa, Canada, and the United States. Mr. Maccall is the author of two works published by the University Tutorial Press, namely:—"Continuous Current Electrical Engineering" and "Alternating Current Electrical Engineering."

Lafayette [*Manchester.*

Mr. W. Tolme Maccall.
Chairman of the North-Eastern Centre of the Institution of Electrical Engineers.

Mr. EDWIN A. UTTLEY, M.I.E.E., M.I.Mech.E., electrical engineer for the Colony of Rhodesia, is now in this country from Bulawayo on leave.

Mr. JOHN R. TAYLOR, who has been for the past eleven years chief assistant to the manager of the Walsall Corporation tramway undertaking, is taking up an appointment as general manager for the Progressive Motor Omnibus Services (Boston), Ltd., which operates fleets of 'buses in the north and south of Lincolnshire.

Mr. T. G. CLARSON has resigned his position with Metrovick Supplies, Ltd., for whom he was latterly in charge of the Domestic and Accessories Sales Department for this country, to take up an appointment as district sales manager, Northern area, for the Jackson Electric Stove Co., Ltd.

St. Pancras Borough Council Parliamentary and General Purposes Committee has given further consideration to the proposal to increase the salary of the chief electrical engineer by £200 per annum, which was referred back by the Council on July 30th. The Committee is still of the opinion that having regard to Mr. Baynes's long service and his responsible position, the salary should be increased.

Obituary.—MR. W. J. KEMP.—The death took place on October 14th, at Greenway, Ovingdean, near Brighton, of Mr. Walter James Kemp, late of the Eastern Extension Telegraph Co., Ltd., aged 47 years.

DR. ING. MAX DIETRICH.—The death is reported from Berlin, at the age of 54 years, of Dr. Ing. Max Dietrich, a pioneer of electric tramways and railways in Germany.

Will.—PROF. JULIUS WERTHEIMER, D.Sc., formerly principal of the Merchant Venturers' Technical College and Dean of the Faculty of Engineering in the University of Bristol, left property valued at £13,693 (net personalty £12,607). He made a large bequest to the Merchant Venturers' Technical College for the institution of a scholarship.

New Companies Registered.

Morgan Weston, Ltd. (200,993).—Private company. Registered October 24th. Capital, £400 in £1 shares. To adopt an agreement with Mrs. Nancy Cope, and to carry on the business of wireless goods dealers and manufacturers, &c. The first directors are:—Mrs. Nancy Cope, 3, Powis Gardens, Golders Green, N.W.; V. E. Cope, 3, Powis Gardens, Golders Green, N.W. Qualification, £1. Solicitor: J. E. Harris, 95, Leadenhall Street, E.C. Registered office: 154, Houndsditch, E.

Hillingdon Screw and Manufacturing Co., Ltd. (201,012).—Private company. Registered October 15th. Capital, £2,000 in £1 shares. To carry on the business of manufacturers of screws and turned parts of mechanical appliances, and fittings of all kinds, including stamp work, press accessories, clocks, telephones, electrical fittings, scientific and other instruments of high accuracy, manufacturers of and dealers in electrical, wireless, broadcasting, telephonic and telegraphic apparatus, &c. The permanent directors are:—O. Turner, 28, Colebrooke Avenue, West Ealing, W.13, engineer (managing director); and Mrs. F. Turner, 28, Colebrooke Avenue, West Ealing, W. Remuneration as fixed by the company. Solicitors: Greene and Underhill, 31, Bedford Row, W.C. Registered office: Hillingdon Heath Engineering Works, West Drayton Road, Hillingdon Heath, Middlesex.

Solex Signs, Ltd. (201,022).—Private company. Registered October 15th. Capital, £2,000 in £1 shares. To acquire the business of electric sign manufacturers and agents carried on by S. H. Grant and W. W. Rogers at Windsor House, Victoria Street, S.W., and to carry on the same and the business of advertising agents, advertising and electrical contractors, dealers in signs, electrical fittings, &c. The permanent directors are:—S. H. Grant, 8, Seaforth Road, Westcliff-on-Sea, advertising agent; W. W. Rogers, 117, Lauderville Mansions, Maida Vale, W.9, advertising agent; N. S. V. Raby, 27, St. Augustine's Avenue, South Croydon, advertising agent. Qualification: £25 shares or stock. Remuneration of first directors until otherwise determined: £6 per week. Solicitors: Rooke & Sons, 45, Lincoln's Inn Fields, W.C.2. Registered office: Windsor House, Victoria Street, S.W.

Coventry Motor Wings, Ltd. (201,006). — Private company. Registered October 15th. Capital, £500 in £1 shares. To acquire the business of electrical engineers carried on by F. C. J. Raven and J. F. Martin at Coventry under the style of Coventry Motor Wings, and to carry on the same, and the business of manufacturers, hirers and repairers of and dealers in motor vehicles and motors of all kinds, aircraft, motor cycles, ships, launches and boats, &c. The subscribers (each with one share) are:—J. F. Martin, 48, Colchester Street, Coventry, sheet metal worker; F. C. J. Raven, 141, Binley Road, Coventry, engineer. The first directors are not named. Secretary (*pro. tem.*): E. L. Wightman. Solicitor: H. L. Wilson, 8, Derby Lane, Coventry.

Woodlight Fittings Co., Ltd. (200,929).—Private company. Registered October 10th. Capital, £500 in £1 shares. To carry on the business of cabinet makers and "Woodlight" electrical fittings manufacturers, agents and merchants, &c. The permanent directors are:—C. H. Cunningham, 28, St. Vincent Road, Egremont, Ches.; H. F. Kerley, 45, Seel Street, Liverpool. Qualification: one share. Secretary: H. F. Kerley.

Morris Electrical Co., Ltd. (200,979).—Private company. Registered October 13th. Capital, £1,000 in £1 shares (400 preference and 600 ordinary). To acquire the business of electrical and wireless engineers heretofore carried on by F. R. Horwood and W. P. Morris at 613, Manchester Road, E., as "Morris Electrical Co." The permanent directors are:—F. R. Horwood, "Homecroft," Eastwood Road, Rayleigh, Essex, electrical engineer; W. P. Morris, 441, West Ferry Road, E.14, engineer. Qualification: 10 ordinary shares. Registered office: 613, Manchester Road, E.14.

The Electricity, Gas, Share, Debenture, Investment and Guarantee Trust, Ltd. (200,978).—Registered as a private company on October 13th, with a nominal capital of £2,000 in 1,800 non-cumulative preference shares of £1 each and 4,000 ordinary shares of 1s. each. The net profits in each year (if any) shall be distributed as to 10 per cent. on the preference shares and as to 90 per cent. (remaining surplus profit) on the ordinary shares. The objects are: To acquire shares, debentures, or other securities; develop, amalgamate, or carry on any trade and finance of electric and gas lighting or any business relating to electrical and gas distribution for light, heat and power, electrical, gas and general engineering, engineering, building, contracting for supply and construction of works, incidental to electrical and general engineers and contractors, and act as stock and share brokers, underwriters, &c. The directors are:—R. H. Smith, Great Mawney, Romford, engineer; and J. Lyons, Onslow Hall, Woking, electrical consultant. Qualification: £25. Remuneration as fixed by the company. Secretary: J. Lyons. Solicitor: H. B. O. May, 22, Charterhouse Square, E.C.1. The registered office is 43, Cannon Street, E.C.

Official Returns of Electrical Companies.

Bennett & Methven, Ltd.—C. E. Methven, of 1, Landcroft Road, East Dulwich, S.E.22, was appointed manager of the company's property on October 2nd, under powers contained in debenture for £210 dated September 3rd, 1924.

British Engineering Units, Ltd.—W. S. Heatley, of Economic Chambers, Little Park Street, Coventry, ceased to act as receiver or manager on September 30th, 1924.

Higgs & Hill, Ltd.—Satisfaction in full on September 10th, of charge dated May 22nd, 1924, securing all moneys due or to become due from the company to the Westminster Bank, Ltd.

English Electric Co., Ltd.—Satisfaction in full (*a*) on August 27th, 1921, of security dated December 12th, 1919, securing all moneys not exceeding £500,000; (*b*) on same date, of charge dated October 13th, 1920, securing £250,000; and (*c*) on October 2nd, 1924, of trust deed dated January 1st, 1921, securing 8 per cent. 6-year secured notes to the aggregate nominal amount of £1,250,000.

Frinton-on-Sea and District Electric Light and Power Co., Ltd.—Satisfaction in full on September 30th, 1924, of debentures dated December 22nd, 1911, securing £400.

Electrolux, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated October 7th, 1924, to secure all moneys due or to become due from the company to Lloyd's Bank, Ltd.

Electrical Conduits, Ltd.—Debenture dated October 7th, 1924, to secure £4,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: G. B. Grant and A. W. Freeman, The Bridge, Walsall.

Ebonestos Insulators, Ltd.—Second debenture dated October 1st, 1924, to secure £5,000, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: T. H. Hughes, Mersey Chambers, Liverpool.

Newmarket Electric Light Co., Ltd. (44,450).—Return dated March 31st, 1924. Capital, £30,000 in £10 shares. 2,656 shares taken up. £26,560 paid. Mortgages and charges, £14,900.

Summers Electric and Engineering Co., Ltd.—Debenture dated October 1st, 1924, to secure £500, charged on the company's property, present and future, including uncalled capital. Holder: Premier Exchange, Ltd., 146, Bishopsgate, E.C.

Brush Electrical Engineering Co., Ltd. (29,533).—Return dated May 12th, 1924. Capital, £600,000 in £1 shares. 448,563 shares taken up. £1 per share called up on 297,388 shares. £297,384 5s. paid, leaving £3 15s. in arrears. £161,175 considered as paid on 161,175 shares. Mortgages and charges, £300,067 18s.

Leamington and Warwick Electrical Co., Ltd. (13,780).—Return dated February 29th, 1924. Capital, £100,000 in 2,500 preference and 7,500 ordinary shares of £1 each. 600 preference and 6,800 ordinary shares taken up. £76,000 paid. Mortgages and charges, £35,000.

Galpin, Hall & Co., Ltd.—Satisfaction in full on September 29th, 1924 (*a*) of mortgage dated January 5th, 1922, securing £900; and (*b*) and (*c*) of debenture and collateral mortgage, both dated September 4th, 1922, securing £600.

City Notes.

Edmundson's Electricity Corporation, Ltd.

An extraordinary general meeting of this company was held on October 15th, Mr. P. D. Tuckett presiding. The chairman said that the meeting had been called to give effect to the proposals which he had outlined at the general meeting in July. They were proposing to split both the preference and ordinary shares into shares of £1 each. It was generally recognised that the market preferred shares of that denomination, and the conversion would tend to improve the price of the shares. The second proposal was to capitalise a portion of the company's reserves with a view to replacing the £2 per share written off the ordinary shares in 1912. If they were proposing to return to the ordinary shareholders £2 per share in cash the preference shareholders might very reasonably take exception to their doing so, because it might impair the financial strength of the company. What they were proposing to do was to distribute to the ordinary shareholders in paper the profit which was realised in paper and which only had a paper value until recently. There was no doubt in the mind of the board that they would be in a position to maintain the 7 per cent. dividend on the ordinary share capital, and to more than cover the dividend on the preference shares. The company was now in a very strong financial position, with large liquid cash resources. They felt that it was in the interests of the company and the shareholders that they should maintain the 7 per cent. dividend on a larger ordinary share capital rather than pay a larger dividend on the existing share capital, because in these days there was so much criticism of companies that were able to show satisfactory profits. Particularly in the case of public utility companies it was very undesirable to emphasise unnecessarily the prosperity of a company. It was further proposed to make one per cent. additional contingent dividend payable to the preference shareholders, preferential and cumulative in the future. That undoubtedly would make them "cleaner" shares for market purposes, and could not fail to enhance their value. They were also proposing to ask the consent of the preference shareholders to their issuing new preference capital if necessary to the extent of any new ordinary capital which they might desire to issue in the future. At the present moment there was no intention of making any fresh capital issue, but at the same time, with an electrical supply company whose capital account was never in a sense closed, and with such exceptional prospects of electrical development in the future, they felt that it was only right and prudent while they were altering the articles that they should make provision for the issue of further preference capital in the event of its being required. The improved results would have come sooner had it not been for the war. In 1913 their net profits were £23,000. Six years later, in 1919, they had shrunk to £8,000, although their business had more than doubled. That was the low-water mark. Four years later, in 1923, they had risen again to £58,000, and this year he did not think they would be less. In 1912, when the capital was reduced, it was bringing them in no return. Last year the whole of their invested capital was bringing them in an average return of 6¼ per cent. Therefore, he did not think they need have any anxiety as to the satisfactory position of the company, or, as far as they could see, to its continued future prosperity. He concluded by proposing the necessary resolutions; these were seconded by Mr. A. Campbell Swinton, and carried unanimously.

Subsequently separate meetings of the ordinary and preference shareholders took place, at which resolutions approving the new proposals were carried.

Swiss Companies.

The report of the *Maschinenfabrik Oerlikon* states that the unfavourable situation persisted in the first half of 1923, and it was only in the spring of 1924 that an improvement was observed; this has since continued so that the degree of activity in all departments is now satisfactory. The improvement in the economic situation has also manifested itself in most other Swiss industries, and has exercised an advantageous influence on the electricity supply works. In the case of most of the latter there has consequently been an increase in the sale of energy, and in accordance therewith

the works have been able to undertake extensions, which has led to the placing of a considerable number of orders through which business in small motors and transformers has materially revived. If the growth of the consumption of current continues, the report states, it may be expected that some of the projected large electricity works will be erected, and that the smaller works will also extend their installations, so that this will result also in the allocation of important orders for large machines. It is added that the export business has also been better. The directors propose to make a distribution at the rate of 8 per cent. for 1923, being at the same rate as in the previous year.

The *Motor Columbus Gesellschaft für Elektrische Unternehmungen*, of Baden, is declaring a dividend of 9 per cent. for the last financial year.

The report of *Escher Wyss & Co.*, of Zurich, for 1923-24 shows a net profit of only 493,070 fr., as compared with 706,000 fr. in 1922-23. It is proposed to pay a dividend of 5 per cent. on the preference and 4 per cent. on the ordinary shares.

Belgian Companies.

Judging from the balance sheets for the twelve months ended with June last, lately issued by a number of Belgian concerns, the past twelve months would appear to have been a profitable one for the Belgian electricity supply industry. The profits of the *Société d'Electricité de l'Ouest de la Belgique* advanced from 622,424 fr. to 973,206 fr.; those of the *Société d'Electricité de l'Est de la Belgique* from 1,304,340 to 2,331,655 fr.; those of the *Société Intercommunale Belge d'Electricité* from 4,571,239 to 6,318,282 fr.; and those of the *Société Ostendaise Lumière et Force Motrice* from 459,857 to 2,566,116 fr.

French Companies.

Compagnie Générale d'Electricité.—At an extraordinary meeting held recently, sanction was given to the increasing of the capital from 60,000,000 to 75,000,000 fr., by the issue of new shares of 500 fr. nominal, at the rate of 1,000 fr. each. During the first six months of 1924 the total of orders delivered showed an increase of 45 per cent. over the same period in the preceding year. The company has taken a share in the financial operations in branch and offshoot companies in which it is interested. Thus, it has used its right to participate in certain increases of capital made by the Compagnie Lorraine d'Electricité, the Compagnie Générale des Câbles de Lyon, the Compagnie Générale d'Entreprises Electriques, the Compagnie des Lampes, and the Compagnie des Produits Chimiques d'Alais, Froges, et Camargue. The investments of the Compagnie Générale d'Electricité in these five companies exceeds 35,000,000 fr. As regards new business, the company took shares, at the beginning of the year, in the constitution of the Société Provinciale d'Electricité, with a capital of 30,000,000 fr. This new organisation is a "holding company" in connection with important distributing companies and others to be formed. Since its formation this new company has taken part in the capital increases of the Compagnie Continentale Edison and the Nantaise d'Eclairage, and has increased its investment in the Société du Nord-Est Parisien. The Compagnie Générale d'Electricité has also taken an interest, with its associates, the Société du Gaz et de l'Electricité de Marseille and its daughter company, the Compagnie de l'Electricité de Marseille, in the formation of the Compagnie Provinciale d'Entreprises, with a capital of 5,000,000 fr., with a view to carrying out various electrical undertakings in the South of France. With regard to electrical manufactures, the company has extended its field of action by acquiring the control of the Société Savoisienne de Constructions Electriques, situated at Aix-les-Bains, which has specialised in the manufacture of transformers.

The Compagnie de la Maison Breguet reports profits of 2,172,000 fr. for the year 1923-24, as compared with 2,158,000 fr. in the preceding year. It is proposed to pay a dividend at the rate of 60 fr. per share as in 1922-23.

The accounts of the *Société Electro-Cable* are reported to show a turnover amounting to 79,440,000 fr. for 1923-24, as compared with 47,425,000 fr. in the previous year. It is expected that the rate of dividend will be raised from 35 fr. per ordinary share in 1922-23 to 40 fr. for the past year.

La Société des Etablissements Industriels Grammont, of Paris, reports a net profit of 4,531,788 fr. for the last financial year, as compared with 4,112,535 fr. in 1922-23.

Prospectuses.

Ayrshire (Local Authorities) Electricity Board.—The list of applications was to close on Tuesday in an issue of £750,000 4½ per cent. stock, 1945-1955, at 96 per cent. The issue is intended to replace in part existing loans and to provide for authorised capital expenditure on the development of the electricity undertakings in the area of supply of the Ayrshire Electricity Board, being the county of Ayr and burghs of Ayr and Kilmarnock, but excluding the burghs of Girvan, Maybole, and Largs, and so much of the parish of Largs as is included in the area of supply of the Skelmorlie Electric Supply Co., Ltd., and elsewhere as authorised from time to time by the Electricity Commissioners. Existing loans and mortgages for short periods, falling due at November 11th, 1924, amounting to about £500,000, will be paid off on November 11th, 1924, and the lenders will have the option of taking the new stock in exchange.

On Monday last the Brisbane Tramway Trust published a prospectus relating to the issue of £1,500,000 5½ per cent. inscribed stock (1944-1954) at £99 per cent. The bulk of the proceeds (£1,400,000) is to be used for the purchase of the system of the Brisbane Tramways Co., Ltd., which is being taken over by the Trust, representing a number of municipal bodies. The Tramway Company's average profit for the years 1916-22 was £153,768—nearly double the amount required to cover the interest upon the new stock.

Stock Exchange Notices.—Application has been made to the Committee to allow the following to the officially quoted:—

American Telephone and Telegraph Co.—$125,523,800 capital stock.

London Electric Supply Corporation.—50,000 six per cent. preference shares of £5 each, fully paid, Nos. 90,001 to 140,000 (non-cumulative).

West Gloucestershire Power Co.—300,000 six-and-a-half per cent. participating preference shares of £1 each, fully paid, Nos. 1 to 300,000, and £300,000 five-and-a-half per cent. first mortgage sinking fund debenture stock.

Dealings in the following have been specially allowed by the Committee.

American Telephone and Telegraph Co.—$125,523,800 capital stock.

Ayrshire Electricity Board.—£750,000 Ayrshire (Local Authorities) Electricity 4½ per cent. redeemable stock, 1945-55, issued at 96 per cent., partly and fully paid.

Shawinigan Water and Power Co.—$2,000,000 new capital stock, partly and fully paid and fractional warrants to bearer.

Wellman Smith Owen Engineering Corporation.—85,000 shares of £1 each, fully paid, Nos. 170,001 to 255,000.

Sunderland District Electric Tramways, Ltd.—At a recent extraordinary meeting the proposals to abandon the whole of the tramway system in favour of motor omnibuses (*vide* ELECTRICAL REVIEW, October 10th, p. 549) were put forward by the chairman (Mr. R. Taylor) and approved. Mr. Taylor said that the competition of motor omnibuses had become very intense in the district. The local authorities were in favour of the suggested change-over, and it was the intention of the company to run 'buses not only over the present routes, but also to extend services to other populous areas.

Stothert & Pitt, Ltd.—The accounts for the year ended June 30th last show a loss of £11,591. During the first six months of the year orders were scarce and unremunerative, but there was an improvement in the latter half of the year. The directors propose to transfer £9,000 from the reserve account, and £2,713 is brought forward, leaving a credit balance of £122 to be carried forward. Meeting: October 27th.

Brampton Bros., Ltd.—The directors report a net profit of £22,313, plus £11,222 brought forward. A final dividend of 7½ per cent. on the ordinary shares makes a total of 10 per cent. for the year. £10,000 is put to reserve and £11,873 is carried forward.

British Electric Transformer Co., Ltd.—Profit for the half-year ended June 30th, 1924, £1,236, compared with a loss of £19,959 for the same period of 1923, and a profit of £9,266 for the first half of 1922.

Hankow Light and Power Co., Ltd.—The *Financial Times* records that a final dividend of 15 per cent. is announced, making 23 per cent., less tax, on the ordinary shares for the year, and 30s. per share on the deferred.

Northern Mexico Power and Development Co.—A dividend of 7 per cent. has been declared on the preference shares bringing the payment up to January 1st, 1922.

Callender's Cable & Construction Co., Ltd.—A dividend of 5 per cent., less tax, has been declared upon the ordinary shares for the half-year.

Montevideo Telephone Co., Ltd.—Final dividend for the year ended July 31st of 3 per cent., less tax, making 5 per cent. for the year.

South African Lighting Association, Ltd.—An interim dividend at the rate of 6 per cent., less tax, is announced.

Brazilian Traction, Light and Power Co., Ltd.—Quarterly dividend of 1 per cent. on the ordinary capital.

Babcock & Wilcox, Ltd.—Dividend of 5 per cent., free of tax, for the half-year ended June 30th.

Stocks and Shares.

MONDAY EVENING.

THE great business of the day is concerned, first, with the German Loan, and secondly, with the General Election. Allotments of the German scrip are out this week, and the prospects of the General Election are held in the Stock Exchange to favour an increase in the Unionist majority, a possible increase also in the Labour representation, both at the expense of the Liberal Party. Market opinion takes the view that unless something very unexpected happens in the voting, the state of affairs after the election will not be very different from what it was before, and on this account, although business is restrained by the political excitements, prices in most of the markets keep firm, the tendency being to improvement

in a good many cases, more especially amongst gilt-edged stocks and industrial shares. The possibility of the Unionists taking office is deemed as being likely enough to justify a certain discounting of this issue.

The continued uncertainty with regard to what is going to happen next year at Wembley has the effect of inducing a certain liveliness amongst the Underground stocks and shares, though prices on the week are not greatly changed. Metropolitans, for instance, have added 10s. to their last week's jump of 2½, and Districts at 50 are again 10s. higher. The Underground stocks are steady. Around East Londons a good deal of controversy rages amongst stockholders who are dissatisfied with the unofficial terms published in connection with the company's stocks that are to be taken over under the new arrangements. East London ordinary remains at 5. If we were compelled to hazard a guess as to what the taking-over value of the stock is likely to prove, we should put it about 5¼. The company's "A" debenture stock stands at 80½, while the "B," Third and Fourth debentures are quoted 77½, 27½ and 11½ respectively. Central London 4½ per cent. debenture stock, guaranteed under the Trade Facilities Acts, is a firm market at 96. London Electric 4½ debenture of the same class is quoted 97, and City and South London 4½ per cent. debenture, another of the group, is also 97. North Wales Power 4½ per cent. debenture stands at 94. A good deal of business is being done in all these four Government-guaranteed stocks.

Amongst the home electricity shares, Edmundsons ordinary are ¼ better at 5¾, in consequence of buying stimulated by the forthcoming reorganisation of the capital. Kensingtons at 9½ are 5s. higher and County of London ordinary recovered to 45s. Bournemouth and Poole have been done at 51s. for the old shares, and there is still a fair demand for them. The new issue changed hands at the same price last Friday.

The manufacturing list is good, though no special change has occurred amongst electrical descriptions. Edisons keep their rise at 6s. The cable section shows further improvement, Callenders being up to 57s. 6d. and Henleys to 56s. 3d., both 1/16 harder on the week. Babcock & Wilcox rose to 47s. 6d., on maintenance of the interim dividend. Iron and steel shares as a whole are disposed to be a little better, on the hopes of better trade when the General Election is out of the way.

Further substantial rises occurred in Mexican Utility stocks. Mexico Tramways Sixes are 8 up on the week, and the company's 5 per cent. bonds at 75 are 2 higher. Mexican Light and Power preferred, after touching 67, reacted to 65½, which still leaves a gain of 6½ on balance. There is no change in the company's bonds. Pachuca Light & Power Fives are a little better at 61. The buying of Mexicans has been very persistent, and, as already mentioned, a fair amount of it is reported as emanating from New York. A loan to Mexico has recently been arranged by a financial house in the United States, and with this American help to the country, optimism looks for a settling-down of Mexican affairs upon a more solid basis than has prevailed for many years past, of peace throughout the land.

Victoria Falls preference are firmer at 30s. 9d. The ordinary shares attract attention on the basis of 34s. 6d., owing to the stronger sentiment noticeable amongst South Africans as a whole. The strike on the Witwatersrand last year, when the men lost time and money, is declared to have had the effect of introducing a juster appreciation of their responsibility for doing a day's work for a day's pay amongst the employés, and whatever affects the principal industry of the Transvaal makes itself felt, of course, throughout the whole of South Africa. No increase in the Victoria Falls dividend is expected this time, but the company makes steady progress and will probably do still better in the future than it is doing now.

The cable group is very quiescent, with small rises in Eastern ordinary and Eastern Extensions as the only alterations in prices. United River Plate Telephones strengthened to 7. Automatic Telephones and Internationals hold their previous prices of 27s. 6d. and 25s. respectively. Marconis have not moved from 1⅛, although speculation is inclined to look favourably on the company, having regard to the fact that the additional broadcasting activity brought about by the General Election may have some effect in swelling the profits of the Marconi concern. Canadian Marconis rose a trifle to 7s. 3d., but otherwise the wireless section is unchanged.

Rubber shares have developed unwonted strength and activity. The price of the produce advanced to 1s. 4½d. per lb. Inquiries about rubber shares have been followed by purchasing orders, but the supply is very limited and practically all the shares in the lists show rises. Business would be better if there were a more liberal quantity of shares available, but holders are not disposed to sell. The standard production of rubber companies affected by the Stevenson Restriction scheme will almost certainly be lowered to 50 per cent. on November 1st.

Share List of Electrical Companies.

Home Electricity Companies.

	Nom. £	Dividend. 1922.	Dividend. 1923.	Price Oct. 20, 1924.	Rise or fall.	Yield. p.c.
Brompton Ordinary	1	12	10	87/-	—	*£5 8 1
Charing Cross Ordinary	1	14	14½	2½	—	7 3 0
do. do. do. 4½ Pref.	1	4½	4½	17/6	—	5 2 10
Chelsea	1	10	12	33/3	—	6 12 7
City of London	1	15	15	48/9	—	6 17 0
do. do. 6 % Pref. ...	1	6	6	23/-	—	5 2 3
County of London	1	10	15	45/-	+ ⅛	6 13 4
do. do. 6 % Pref. ...	1	6	6	23/-	—	5 4 4
Edmundson's Ordinary	3	7	7	5¾	+ ¼	3 18 8
do. 5 % Pref.	5	5	5	5¼	—	5 9 1
Kensington Ordinary	5	13	14	9½	+ ½	7 17 4
London Electric	1	10	10	80/-	—	6 13 4
do. do. 6 % Pref. ...	5	6	6	5½	—	5 14 3
Metropolitan	1	8½	10	1⅜	—	6 3 1
do. 4½ % Pref.	1	4½	4½	17/6	—	5 2 10
Newcastle-on-Tyne Ordinary ...	1	2½	6	1	—	6 0 0
do. 5 % Pref. ...	1	5	5	17/-	—	5 17 8
do. 7 % Pref. ...	1	7	7	25/-	—	5 12 0
Notting Hill 6 % Pref.	10	6	6	9½	—	6 6 4
North Met. Elec. 6 % Pref. ...	1	6	6	1⅛	—	5 6 8
Urban Ordinary	1	—	4	19/3	—	4 4 8
do 6 % Pref. ...	1	5	6	1	—	6 0 0
St. James' and Pall Mall ...	5	14½	17½	13½	—	7 4 5
South London	1	11	15	43/9	—	6 13 7
South Metropolitan Pref. ...		7	7	1½	—	5 13 0
Westminster Ordinary	5	13	15	10	—	7 10 0
Whitehall Elec. Invst. 7½ % Pref.	1	7½	7½	19/-	—	7 18 0

Home Rails.

Central London Ord. Assented Stock	4	4	70	—	5 14 2	
Metropolitan ... ... ,,	3½	4	77	+ ½	5 4 0	
do. District ... ... ,,	3	3½	53	+ ½	7 0 0	
Underground Electric Ordinary	10	Nil	Nil	2¾	+ ¼	Nil
do. do. "A" ...	1	Nil	Nil	7/8	—	Nil
do. do. Income Bonds	5	6	96	—	*6 5 0	

Telegraphs and Telephones.

Anglo-Am. Tel. Pref. ... ... Stock	6	6	104½	—	5 11 10	
do. Def. ... ... ,,	1½	1½	23½	—	6 6 4	
Chile Telephone	5	6	6	6½	—	5 9 1
Cuba Sub. Ord.	10	7	7	7	—	10 0 0
Eastern Extension...	10	10	10	16¼	+ ¼	6 4 0
Eastern Tel. Ord. ... ... Stock	10	10	161½	+1	6 4 0	
Globe Tel. and T. Ord.	10	10	10	17½	—	5 16 9
do. do. Pref. ...	10	6	6	11½	—	5 6 8
Great Northern Tel.	10	24	22	29½	—	7 9 2
Indo-European	25	7	7	8½	—	*5 6 1
Marconi	1	15	10	1⅛	—	6 3 1
Oriental Telephone Ord.... ...	1	12	12	1¾	—	*6 12 7
United R. Plate Tel.	5	8	8	7	+ ⅛	*5 14 6
West India & Panama	10	Nil	Nil	1/-	—	Nil
Western Telegraph	10	10	10	15½	—	6 6 1

Home and Foreign Trams, &c.

Anglo-Arg. Trams First Pref. ...	5	12½	5½	8¾	—	8 3 0
do. do. 2nd Pref. ...	5	5½	6	9½	—	9 4 6
do. do. 5% Deb. ... Stock	5	5	73½	—	6 16	
British Electric Traction Ord. ... ,,	5	6	94½	—	6 7 0	
do. do 6% Pref. ... ,,	5	6	102½	—	5 18 3	
Brazil Traction 100	4	4	57½	—	6 19 0	
Brit. Columbia Elec. Ry. Pcs. Stock	5	5	87½	—	5 14 3	
do. do. Preferred ,,	5	90/-	86½	—	*5 13 6	
do. do. Deferred ,,	8	129 5	105½	—	*6 3 3	
do. do. Deb. ,,	4½	4½	81½	—	5 4 4	
Lond. & Sub. Trac. 5 % Pref. ...	1	5	2½	9/-	—	6 5 0
London United Tram. Deb. ... Stock	4	4	56½	—	7 4 2	
Mexico Trams. 5% Bonds ...	—	Nil	5	75	+2	6 13 4
do 6% Bonds ...	—	Nil	Nil	63	+3	Nil
Mexican Light Common ... 100	Nil	Nil	28	+3	Nil	
do. Pref. 100	Nil	Nil	65½	+6½	Nil	
do. 1st Bonds ... —	5	5	67	—	7 9 3	

Manufacturing Companies.

Babcock & Wilcox...	1	20	12	47/6	+9d.	*5 1 1
British Aluminium Ord.... ...	1	5	5	23/9xd	—	4 4 8
British Insulated Ord.	1	15	15	56/3	—	5 6 9
Callenders	1	15	15	57/8	+ ⅛	5 4 4
do. 6½ Pref....	1	6½	6½	23/9	—	5 9 6
Crompton Ord.	1	5	Nil	⅜	—	8 17 10
Edison-Swan	4/-	7½	—	6/-	—	5 0 0
do. ,, 5% Deb. ... ... Stock	5	5	71½	—	6 19 10	
Electric Construction	1	10	10	1⅜	—	7 5 6
English Electric	1	8	5	16/3	—	5 19 5
do. do. Pref.	1	6	6	19/6	—	6 3 1
Gen. Elec. Pref.	1	6½	6½	22/3	—	5 16 10
do. Ord.	1	5	5	17/9	—	5 12 6
Henley	1	15	15	56/3	+ ⅛	5 6 9
do. 4½ Pref.	5	4½	4½	4½	—	5 0 0
India-Rubber	1	10	5	16/3	—	*6 3 1
Met.-Vickers Pref.... ...	3	8	8	2¾	—	6 14 9
Siemens Ord.	1	5	—	1	—	5 0 0
Telegraph Con.	13	20	20	26	—	*4 16 3

* Dividends paid free of Income Tax.

Electrical Service: Some Notes on its Obligations.

By ERIC G. ROSS, A.M.I.E.E.

(*Concluded from page* 570.)

(3) *The service must be accepted without a grudge.*—This is largely the crux of the whole matter. Note that the word "accepted" is clearly accented. It is one thing to *give* a service, and quite another to *accept* it. Further, it is in getting the service accepted that the whole art of giving it lies. Cases are well known to the reader, as well as to the writer, where, on entering a given store (electrical as much as any other) to purchase, the article has been literally "thrown" at the buyer with nothing more or less than a "take it or leave it" attitude manifested on the part of the "servant," which is little short of deplorable.

What does the *acceptance* of a business service mean? It means that the customer considers himself met in all essential respects, which latter mainly are, that he is satisfied—

(*a*) with the price paid,
(*b*) with the courtesy extended to him,
(*c*) that he has not been "done" by "dud" servants,
(*d*) that the article bought is guaranteed by a firm which will steadfastly stand by its guarantee.
(*e*) that he may safely use it *himself*, efficiently, by following out the instructions given him,
(*f*) that the purchase is *finished.*

Something about (*a*), (*b*) and (*c*) has already been said. The other aspects, (*d*), (*e*), (*f*), however, cover some points often little noticed.

The *exact policy* of the seller, as regards guarantee, must be made quite clear to the buyer. It is not sufficient, merely to cite the usual rigmarole about "If it is proved to our satisfaction that the breakdown is traceable to faulty workmanship....." and so on. *The possible causes of breakdown* must be indicated, preferably in a manner which will keep them before the buyer's mind every time the article is used, and due instruction must be given him as to where the responsibility lies in each case. Surely it is only by so doing that both article and dealer (servant) get a fair chance, and it is well known that lack of definition here has cost the trade much valuable business. A buyer should be told candidly what to do with his purchase and what *not* to do with it. Herein, of course, lies that essence of service training, tactful instruction. How, indeed, can any non-technical man be expected to understand the working of even a simple electric kettle, if he is not told about it? And the ignorance of the same person, respecting things electrical, is profound!

With regard especially to (*f*), the question of *finishing* the purchase is very important indeed. The reader is here referred to an article published in this journal on May 16th, 1924, entitled: "Why not Allow Rebates instead of Charging Extras?" Therein the meaning of finishing a purchase is fully gone into. The usual method of pricing by quoting a large main item plus many extras is greatly to be deprecated. A buyer requires to know *just how much* he *must* spend, to obtain a good, and complete, job, *before he goes to buy.* He does not want to buy "this" and find later that he has to buy "that," and again "that," in order to *use* it, let alone use it properly. Incidentally, he does want to know just how much he need *not* buy. This information can only be satisfactorily received by him by quoting an *inclusive* sum, together, with fully detailed *rebates* referring to what he might not need. The price of a lighting fitting, for example, should be quoted, first, absolutely complete, *including erection and lamps.* Then rebates should be cited, if, for instance, he already possesses cable, or lamps, or will put it up himself, and so on. It is not a hard job to quote in this manner, and indeed, in addition, it meets the essential pointed out under (1); it lays the firm's price policy bare to all, and that without any loss of prestige. The article referred to goes into this matter fully, and that which is perhaps less obvious here, is therein made quite clear.

4.—The salient points of this have really been referred to under the last heading. There also are mentioned the main aspects in which the customer *desires* to be met, and in which, it is expected, he will in the future *demand* to be met. Price is, of course, the fundamental. It is comparatively rarely that the "cheapjack" in any trade fails to make a good living (quite irrespective of his methods of so doing). How much the reverse is it with the dearer-priced goods dealer—quite irrespective of quality! There is no doubt whatever that prices must continually come down. Henry Ford has proved this to be absolutely an essential for the continued success of his world-wide motor-car service system (*vide* his remarkable biography). Anything, therefore, which tends to keep up prices must be vigorously combated and discredited. Thus, faulty and inaccurate costing by anyone concerned must be eliminated. It is not sufficient to say that the makers allow 25 per cent., say, discount from a list price to cover costs and profits. It is well known that some retailers (electrical) clear a "very good thing" on this basis, while others call continually for 33⅓ per cent. discount because they seem to be unable to make ends meet at all on the same basis. Very probably, much of this is consequent upon a lack of realisation that the price, of necessities at any rate, is now in the process of being fixed, not by what a retailer thinks he can get for them, but by what the buying public can afford to pay for them. And, the price being thus fixed within certain fairly obvious limits, profits can only accrue by the cutting-down of costs in the internal affairs of the concern. This does not necessarily mean the cutting-down of wages, but it does mean the institution of the most modern methods of dealing and manufacturing, together with a proper adjustment of oncosts to turnover. Only after that comes profit. Apropos, it is of interest to note that Ford's profits are not more than 3 per cent. of his turnover.

Trade agreements are likewise liable to condemnation as being price raisers. At most they seem to be merely means to cover up lack of business acumen on someone's part, and as such, they are questionable conventions. It is well to reflect on the continued extension of the larger electrical manufacturers. Some day they will have extended their local branches to such an extent as to be in the position of cutting out the local retailer altogether at will. Then the service at present given to the retailer will be given direct to the customer, simply because the enormous extent of the large firms' activities will *necessitate their doing so*, quite apart from whether the consumer will clamour for the abolition of the retailer or not. The prospect of this, of course, is not immediate, but such a state of affairs is possibly nearer at hand than some realise. Even as it is, the evident reluctance of many manufacturers to enter into any binding trade agreement with either factor or retailer seems to indicate the trend of events. High prices are deterrent to rapid progress; manufacturers' prices are greatly below retail prices; goods are not now being, and will not be, bought in sufficient quantity at these retail prices; the consumer is slowly awakening to this fact; large firms will not suffer loss of sales through an

artificial lack of market for their huge outputs; they will *require* to get rid of their products in *some* way, and a reorganisation of the present selling system must inevitably follow.

This constitutes a somewhat unexpected development of the working of "service," but one, it must be admitted, fully demonstrated, in America, by Mr. Henry Ford.

The object of the foregoing, however, is rather to emphasize the importance of meeting the customer in all essential respects. This may seem to be a very one-sided arrangement, but it is not really so. As has been already mentioned, as soon as a firm's *price policy* has been fixed, *and displayed to the view of all*, then it is easy enough the meet the buyer. The price policy might be denominated *the* fundamental difficulty of service. It therefore merits very serious attention. Not only must an article be stocked as an article of sale, but as an article requisite to be used either with or without another part, *at the option of the buyer*. The limitations and exact capacity of any article must, therefore, be explicity stated upon it or upon the package. This is, after all, only a *duty* of the servant, and to do it requires all the expert knowledge at command. It is just in the proper education of the consumer to the use of a purchase that service skill is shown to its best advantage. Here note a common error of instruction. People are usually told that they *should* do with an article. Why not tell them what they *must* do with it and finish the matter? It is quite essential to make customers catch hold of the proper dynamic spirit of a sale, as against laying hold of a superficial static aspect of the matter, and tactful, yet forcible, education and persuasion go a long way towards the attainment of this desirable end. The necessity of showing a buyer just what he wants under practical test is, therefore, very obvious. He will not be more easily met in any other way. Working demonstrations are essential to the giving of efficient service. The demonstrations, also, must not be confined to ironing, heating, boiling kettles, and the like, but must show *the installation of the article;* and this leads to

(5) *The service must be quite flexible, i.e., capable of being accepted in whole or in part at the discretion of the buyer.*—The inherent disgust of most people, at requiring to have men about a house, pulling walls down and generally making a mess, is well known. Further, utter strangers are not, as a rule, welcome in any house. The customer must be met here also. If a man is not wanted in the house to install the parts bought, then he must not be sent. Instead, the system of installation must be such as to allow the owner to fix it up himself if he wants to. This seems to be, and doubtless is, quite contrary to all precept, but it is a point of service to cater for it. To meet this requirement in addition to meeting wiring regulations, insurance companies' rules, &c., is no small order, but it will require to be done. The recent large growth in the number of surface wiring systems is one proof that it is recognised by *makers*, at least, that it *must* be done. In short, the whole of electrical service, from the supply of energy to the consumption of it, must be conducted in some manner to overcome all wants and objections. Personal indignation resulting from certain customers' purchases must definitely be cut out. It must be realised that the question rests entirely in the customer's hands—and pocket. Only on this basis can service be service at all.

(7) Withal, *the service must be continuous up to a certain point.*—It is, possibly, hard to reconcile this with what has gone before. Nevertheless, pride must not stand in the way of true service. If at one time a dealer is turned down, he must still hold his service ready to be accepted next time. (The travelling salesman knows only too well the truth of this.) Only in the last extremity must the opportunity of doing a service be declined. As the reputation for good service spreads, so also does the reputation for bad service. In this perhaps more than anywhere else "a little leaven leaveneth the whole lump," which must be remembered.

Apart from this moral aspect, however, continuity of service is more concerned with upkeep and maintenance. The principles of a normal "hire service" probably illustrate this best of all. With an electric cooker, say, the repairs staff must be ready to serve at any hour, or, at least, at such an hour as will cause the least inconvenience to the user of it. This pretty well necessitates a night and a day staff; not a hard matter in a municipal scheme, but it must necessitate a re-arrangement of many dealers' staffs. At the moment, of course, the average dealer's sales do not reach the point where such meticulous service is required—but some day, it is hoped, they will. This arrangement of staffs, &c., will then be the rule rather than the exception. The same remarks apply to the week-end, since a cooker is just as likely to give out then as at any other time.

All of this raises the question of charging for such attention. Two methods are available, *viz.*, to sell the article at a net price plus an annual charge for upkeep, or to sell it at a price which will cover a stated number of repairs within a certain time. The latter is the best method, as it meets all the requirements of good service. Service *must* extend to such a time, after the sale of the article, as will ensure that the user of it has learnt all there is to learn about it from experience. After that the value of the original service depreciates relatively, of which, it is suspected, most users of electrical apparatus are, at least vaguely, aware. Broadly, the service attendant on a sale may cease after a certain time, that time being ultimately fixed from experience. It is suggested that it is not hard to fix. Most humans are painfully aware of the time just when any effort made begins to lack appreciation. Generally, this time is not very short, but on the other hand it is not too long. It must naturally vary with every locality, but the main point is that it *can* be fixed.

So there is a definite limit to service; which fact is generally overlooked. Lack of appreciation of this is the cause of most of the backwardness anent service at present existent in the minds of electrical traders. Too often the thought is "How long *am* I to serve?" Rather should it be: "Just how long will it be *necessary* to serve this man?" People can become tired of too much attention, and here also the experienced servant rises to the occasion. An essential part of service training is to know just when the service is no longer required.

Reflection upon the foregoing remarks will reveal the fact that the surface of the matter of service has merely been skimmed over. The ramifications of service are so vast that it is quite impossible to do more in the space at disposal. Suffice it to say that the main object of the commentary is to accentuate the fact that, when electrical men use the word *service* as their slogan, in so doing they are embarking on a much bigger undertaking than at present they seem to realise.

Service as an advertising "stunt" is one thing; service as a *duty*, quite another.

British and Italian Engineers in America.—An informal luncheon was given on September 26th by the presidents and governing boards of the four founder engineering societies at the Engineers' Club, New York, in honour of Sir Charles Morgan, president of the Institution of Civil Engineers; Sir Charles A. Parsons; Senator Luigi Luiggi, president of the Italian Society of Engineers; and Mr. William H. Patchell, president of the Institution of Mechanical Engineers, who came to attend the sessions of the recent centenary celebration of the Franklin Institute, Philadelphia. Sir Charles Morgan and Mr. Patchell were unfortunately unable to be present, but Sir Charles Parsons and Senator Luiggi responded to the addresses of welcome. Sir Charles Parsons thought that further steam installations would meet the major needs of electrical development for many years to come, their initial cost being so much under that of hydro-electric plants. Senator Luiggi referred to the improved status of engineers in Italy and the policy of the Italian Government in encouraging hydro-electric and other public utilities to be carried through on private initiative but with government subsidies sometimes reaching 60 per cent. of the cost. He referred also to the Italian utilities that were being transferred from governmental to private control.—*Electrical World.*

The Factories Bill, 1924.

(*Concluded from page 593.*)

Part III.—Welfare Provisions.

Supply of Drinking Water (38).—This clause calls for an adequate supply of wholesome drinking water, either from a main or in suitable vessels, and, if in vessels, to be renewed daily, steps to be taken to preserve the vessels from contamination.

Washing Facilities (39).—A new condition, involving many employers in considerable expense, is called for in this clause, which says that at least one basin for every 10 persons, with an adequate supply of water, is to be provided. Unless steps are taken in the Bill to compel the workers to use them, this will prove an unnecessary expense. Many cases are known where an adequate number of wash basins have been provided, including towels and soap, and these have been used very little, and often the towels and soap stolen. Although this aims at an ideal which most employers would like to see, at the same time it is felt that during the present depression in trade it is not the time to enforce such a condition on all factories irrespective of whether the work is or is not such as demands washing before leaving to ensure good health.

First Aid (40).—This provides for accessible first-aid boxes and cupboards, with no change from the existing legislation.

Facilities for Sitting (41).—This is a new condition, and calls for the provision of seats to enable female workers to rest during their employment. In many cases this may be an advantage and tend to increase production, but in other cases additional expense may be incurred without corresponding advantage.

Accommodation for and of Drying Clothing (42).—This clause provides for accommodation of clothing during working hours, including reasonable practicable arrangements for drying clothing if wet. This is something quite new, and, although desirable, will probably involve the majority of employers in expenses which they are unable to carry at the present time.

Supply of Protective Clothing (43).—This calls upon the employer to provide and maintain protective clothing for persons exposed to acids or poisonous and offensive substances likely to injure the person or clothing. This, as it stands, is a very wide clause, and might be interpreted to mean the supply of overalls, for instance, in the case of a man operating a machine in which cutting compound or oil is used which may splash on to his clothes. It is probably not the intention of the promoters of the Bill to include such cases, and it therefore requires defining within closer limits.

Weekly Rest Day (45).—This new condition defines that all persons should be allowed a period of rest of not less than 24 hours in the 36 hours between 6 p.m. on Saturday and 6 a.m. on Monday morning, or, in the case of a person of the Jewish religion, 6 p.m. on Friday until 6 a.m. on Sunday morning. This will prevent week-end repairs being carried out continuously. The only way this can be done is by exemption by special order of the Secretary of State.

Part IV.—Special Provisions and Regulations for Health, Safety, and Welfare.

Removal of Dust or Fumes (46).—Employers are compelled to take all practical measures to protect workers against the inhaling of dust or fumes, and to prevent dust accumulation. No internal combustion engine is to be used unless so enclosed as to prevent fumes entering the room. This latter clause largely affects very small factories, a number of which are driven by small gas engines situated in the factory.

Prohibition of Spitting (47).—This is a most excellent clause in connection with the prohibition of spitting on the floor and walls, and the employé is included with the employer as liable to a summary conviction for this offence.

Meals in Dangerous Trades (48).—This now includes highly silicious dust with the other poisonous substances, including lead and arsenic, and forbids persons to take meals or remain in the room during hours of rest; it also compels the employer to provide a suitable messroom in such cases.

Clause 50 prohibits the employment of female young persons in glass melting and blowing factories, annealing glass other than plate or sheet, evaporating of brine or finishing of salt, but gives the Secretary of State power by special order to extend this section to any process in which on account of the special circumstances it appears to him undesirable that female young persons should be employed.

No. 51 is an entirely new clause with regard to women and young persons, in which the Secretary of State has power to prescribe the maximum weights that may be lifted by this class of labour.

(According to Clause 137 a woman is a female who has attained 18 years of age, a young person is an individual, male or female, who has attained 14 years but not reached 18 years.)

Metal-grinding Factories (56).—This extends the regulations of the 1901 Act (88) in regard to metal grinding in tenement factories by specifying the minimum distance between grindstones and their position with reference to one another.

Power to Make Regulations for Safety and Health (61).—This gives the Secretary of State power to make regulations which appear to him reasonably practicable and to meet a case where he is satisfied that they are necessary to secure the safety and health of employed persons.

Part V.—Notification and Investigation of Accidents and Industrial Diseases.

The first appreciable change in the existing regulations is in Clause 68 (8), and it allows a person to be appointed by an association of persons to which a man killed by accident belonged at the time he was killed by accident, or by the association of employers of which the factory occupier is a member, to attend and examine witnesses, &c., at the inquest.

Part VI.—Employment of Women, Young Persons, and Children.

Hours of Employment of Women and Young Persons (72).—This clause is the one referred to in the earlier preamble with regard to the reference in this Bill to the Hours of Industrial Employment Bill presented in July this year, and, as beforesaid, it may have the most serious effect on the industry of this country by putting it at a disadvantage as compared with competitive nations.

It specifies that the hours of employment for this class of labour shall not exceed nine in any day, or 48 hours in any week, exclusive of intervals, or 11 hours per day including intervals; employment is not to begin earlier than 6 in the morning or end later than 8 at night or 2 on Saturdays, nor be for more than a spell of 4½ hours without an interval, provided that where a rest interval of not less than 15 minutes is allowed in the course of this spell, the spell may be increased by the length of the interval. These provisions do not apply to any persons in the management not usually employed in manual labour.

Clause 74 prohibits women or young persons being employed outside the factory an additional time to that laid down for the day's working in Clause 72.

Annual Holidays.—Clause 77 specifies the usual holidays, but with the addition of four whole days fixed by the occupier, and sets forth that a notice must be posted not less than four weeks before the holiday, otherwise the day shall not be deemed to be a whole holiday. It prohibits the employment of a woman or young person in or about the business of a factory on a holiday.

Meals and Rest (79).—Certain exceptions to the meal interval are provided in this clause, where processes are continued and where canteens are provided and it is necessary to divide the persons into sets.

Exceptions as to Intervals (80).—This clause gives exemption to young male persons employed in the manufacture of wrought iron, steel or tinplate, or the manufacture of paper, melting, blowing or annealing of glass.

Exceptions as to Overtime.—Clause 86 gives the Secretary of State power to make an order allowing overtime employment of women (provided he is satisfied that their health will not be affected) on any day except the short day, provided the total period of employment does not exceed 12 hours per day, and the total hours worked do not exceed 10 on any day, or exceed 45 hours in any calendar year when the overtime is on account of extra pressure of work at recurring seasons or due to pressure of orders arising from unforeseen events, or 75 hours a year in the case of perishable goods, or 30 minutes a day (but not to exceed a total of 48 hours in that week) in the case of processes which cannot by reason of their nature be accurately fixed.

Exceptions as to Male Young Persons Employed in Shifts (87).—This clause allows young male persons over the age of 16 to be employed on a shift outside the hours specified in this part of the Act. It does not, however, allow boys between 14 and 16 years of age who are at present employed in some operations of the steel industry on shifts to be so employed, and thus lays still further burdens on that industry, which is at present in such a depressed state.

Power to Suspend Certain Provisions of Part VI.—Clause 90 gives power to the Secretary of State to vary the hours and holidays fixed under this part of the Act in case of breakdown or accident.

Certificate of Fitness of Young Persons for Employment (91).—This clause calls for the medical examination for fitness of all young persons under the age of 18, whereas at present medical examination is only compulsory for those under the age of 16. This extension seems an unnecessary expense to the nation, and nuisance to the employers. In the case where the doctor specifies re-examination at intervals, due to unfitness, the employer is involved in further expense, and this is likely to prevent the young person from obtaining employment. The onus of carrying out these provisions may be placed by the Secretary of State upon the local authority.

Power of Inspector to require Certificate of Capacity for Work (92).—This clause gives the inspector power to instruct the employer to terminate the employment of young persons up

to the age of 18, as against 16 in the 1901 Act, who are suffering from disease or bodily infirmity which incapacitates them from working the hours allowed by the law. It is difficult to see the necessity of such a clause, for one would have thought that in his own interest an employer would not employ persons physically unfit.

Part VII.—Special Applications and Extensions.

Tenement Factories (94).—The owner instead of the occupier is made liable for the observance of the Act and penalties therein, as follows:—

Part I. Overcrowding, ventilation, drainage, sanitary conveniences, cleanliness, temperature, and lighting.

Part II. [all, except] Means of access, cleaning of machinery by women and young persons.

Part III. Drinking water supply and washing facilities if involving structural provision.

Part IV. All parts, except that the occupier is responsible for horsing chains, hooks and fastenings for grinders being kept in efficient condition.

Part VI. Notices fixing hours of employment.

Part X. Regarding fixing of abstract and notices.

Premises where Part of Building is Separate Factory (95).—This clause provides that where a part of a building is let off the owner of the building is liable for the observance of the provisions of the Act with regard to sanitary accommodation, means of escape in case of fire, safety provisions in case of fire, safety of hoists and lifts, cleanliness of sanitary accommodation.

Part VIII.—Home Work.

No appreciable change.

Building and Engineering Works (99).—At first it may be thought that this may need special consideration, but on referring to Clause 137 we find that engineering work is described under the general interpretation as the construction of a railway, tramroad or tramway, &c., in other words, largely civil engineering work, and does not include the installation of machinery. The electrical contractor, however, contracting for a whole power station would come within the terms of this clause.

Part IX.—Particulars of Piece Work and Wages.

Particulars to be given to Pieceworkers (103).—In the existing legislation this clause only applies to textile factories, except by order. The new Bill brings all factories within these regulations which compel the employer to give the employé such particulars as to compute the total amount of wages payable to him, either before the work starts or as soon as practicable after the work is completed. It also forbids either the rate of wages or work being expressed by means of symbols, except that work of a standard kind may be described by a figure, letter, number or name, or combination thereof. Joint piecework is also covered. The employer is compelled to give the rate of wages applicable to the work done by the gang and the proportion, if fixed by the employer, according to which the wages of the members of the gang are calculated. This need not be applied to each member, provided the contractor furnishes the particulars to the member of the gang to whom the wages are paid, or exhibit a placard in the place in which the work is done. Further, if a person employed is required to return any written particulars with the work to another person, that is, one operation to another, copies shall be furnished to the person employed which he may retain for his own use, or a book shall be supplied in which he may enter such particulars. Where automatic indicators are used this will apply largely to winding machines where the number of turns are counted automatically. These indicators have to be marked with the number of teeth in each wheel and such particulars as will enable the accuracy of the indicator to be checked.

In this section there is also a protection to the employer against employed persons divulging trade secrets, providing penalties against the employé and any person outside not an employé who persuades an employed person to disclose such particulars.

Weights and Measures Used in Ascertaining Wages (105).—This clause provides for the checking or weighing of measuring instruments on which wages are paid similar to the present regulation with regard to similar instruments for the trade.

Part X.—Notices.

Clause 106.—Notice to inspector of district of occupation and use of premises as a factory, &c.

Clause 107.—Posting of a prescribed abstract of the Factory Act; address of inspector of district and the superintending inspector of the division; disposition of standard clock, if any. Persons defacing notices are guilty of an offence under the Act and liable to fine.

General Registers (Clause 108).—General registers have to be kept giving prescribed particulars of young persons employed, and particulars as to washing, white-washing or colour-washing the factory, &c.; accidents; cases of industrial diseases; examination of steam boilers; record of exceptions granted to any factory; and any other matters that may be prescribed.

Clause 109 provides that general register and other records shall be kept available for at least two years after the date of the last entry.

Clause 110 gives the Secretary power to ask for records at intervals of not less than one and not more than five years, of the number of persons employed, age, sex, occupation, hours of employment, &c.

Duties of Persons Employed (111).—This is a new clause, and it deals for the first time in a general way with the duties of the employé. This is all to the good, particularly when one considers the obligations of the employers under the existing Compensation Act. Seeing that such onerous conditions are laid upon the employer it is gratifying to note that under Part 12, describing penalties (Clause 121—sub-sections 3 and 4) all persons, including employés, are liable to fine, and the occupier is jointly liable with the employé unless he proves that he has taken all reasonable means to enforce the provisions and prevent contraventions.

Part XI.—Administration, &c.

This covers the administration of the Act, including appointments and duties of inspectors, clerks, and servants; describes the powers of the inspector, both in the factory and in the courts; the appointment and duties of doctors, including their fees; provisions as to orders of the Secretary of State. There is no appreciable change from the 1901 Act, and as it does not largely concern employers we do not propose to deal in detail with the clauses of this section.

Part XII.—Penalties.

Clause 121—see Clause 111.

Sub-section 5 of this clause gives very wide powers in so far that the whole of the directorate and management of a company are guilty of an offence unless they can prove that the offence took place without their consent, connivance, or wilful default.

Part XIII.—Interpretation.

Clause 136 gives an interpretation of the term "factory" in the widest possible degree. It includes all places where, for the purpose of sale, work is carried on such as making an article, or part of an article, altering, repairing, finishing, cleaning, breaking up or demolition, adapting for sale, where electrical energy is generated or transformed for supply by way of trade, for traction, the lighting of streets, public buildings, &c., but excludes a transformer station where there is no moving machinery and no person regularly employed, unless the Secretary of State directs by order; and includes places for the sorting of material or articles as a preliminary to working in a factory.

At the same time attention is drawn to Sub-section 7, which gives the Secretary of State power to class different branches or departments of the same factory as different factories. This, for instance, will give power to the Secretary to apply grinding regulations, but only to that portion of a large shop in which the grinding machines are situated, provided the rest of the shop is occupied upon other classes of work.

Clause 137.—(See clause 99.)

Clause 138 applies the Act to factories belonging to the Crown and Public authorities.

Electrolytic Sodium Hypochlorite.—A North of England firm will shortly place on the market a new and convenient type of electrolyser for the production of sodium hypochlorite on board ship. During the war the electrolyser was instrumental in greatly reducing the spread of disease by secondary infection. There is no more valuable sanitary agent than electrolytic hypochlorite, which rapidly destroys bacteria and is a powerful deodoriser. It was used on all hospital ships during the war, and at least one great shipping line uses electrolysers on all its vessels now. The bactericidal properties of sodium hypochlorite, especially in the higher concentrations, are finding some application to surgical work, especially in India. The drawback of certain chemical preparations is that, while they are satisfactory for industrial purposes, they cannot be stored in quantities because they deteriorate; but with portable electrolysers, just sufficient can be made for immediate requirements.

One of its hygienic uses is the sterilisation of water, and it is also valuable for flushing drains and passages. It is made by passing direct current through a solution of common salt and water; hydrogen gas is given off at the negative electrode, and sodium hypochlorite is formed in the solution.

The industrial uses of sodium hypochlorite are many. It is now used in the textile industry for bleaching, and is gradually ousting bleaching powder, because it contains no lime, and no objectionable deposits are left on the fibre. Further, over a period, and especially in hot countries, bleaching powder loses its strength. Sodium hypochlorite is of value in the chlorination of wool, imparting to the material a better "fell" and lustre, and a greater affinity for dyestuffs and, to a great extent, rendering it immune to felting and shrinkage. In this connection electrolytic sodium hypochlorite has the advantages of uniformity of strength and freedom from lime salts. Another important application of electrolytic hypochlorite is the bleaching of paper pulp. The pulp is bleached and washed in the mass, and the absence of calcareous deposits is of great value in permitting an easy penetration of the liquor. The regular activity and strength of the electrolytic hypochlorite are of great value in giving consistent results of high quality.

Some of the Exhibits at Wembley.

Electric Control, Ltd.

(Stand No. 107, Avenues 14, Bays 7 and 8.)

Motor controllers and overhead transmission line equipment are exhibited by this company. The apparatus illustrated in fig. 126 is typical of the line equipment which is on view. This is a pole-type switch for a 22,000-V, three-phase overhead line, of the horn-break type, fitted with fuses and choke coils for protection against short circuits and surges. Fig. 127 illustrates a graded rod lightning arrester. This is designed for the dissipation of abnormal potential rises, and it is claimed to be the only horn-type arrester which automatically adjusts its resistance to the capacity of the potential disturbance. It comprises a horn gap in conjunction with a number of rod-type resistances enclosed in weatherproof insulating tubes, connected in series and to earth. At the "no-resistance" points the arrester is also provided with sphere gaps for high-speed operation. The action of the gear is as follows:—The arc caused by a pressure rise will start across the sphere gap, and if the rise has a low energy capacity, the current flowing across this gap and through the total resistance to earth may be sufficient to keep the voltage down to approximately the normal value. If the current is insufficient the arc will rise to the lowest of the rod resistances, and so on upward until, if necessary, it is attentuated and broken at the top of the horn gap. Where extra heavy rises are anticipated, an auxiliary gap is shunted by one of the company's "Empire" fuses, which is placed in series with the main horn. If the discharge should reach the "no-resistance" step of the arrester, allowing the passage of a heavy current, the fuse blows and places the auxiliary gap in series with the main gap. Fig. 129 shows another application of the "Empire" fuse, where it is combined with an isolating link and choke coil; this apparatus is designed principally for indoor work. There are, in addition to the foregoing, examples of isolating links of various patterns for both indoor and outdoor applications.

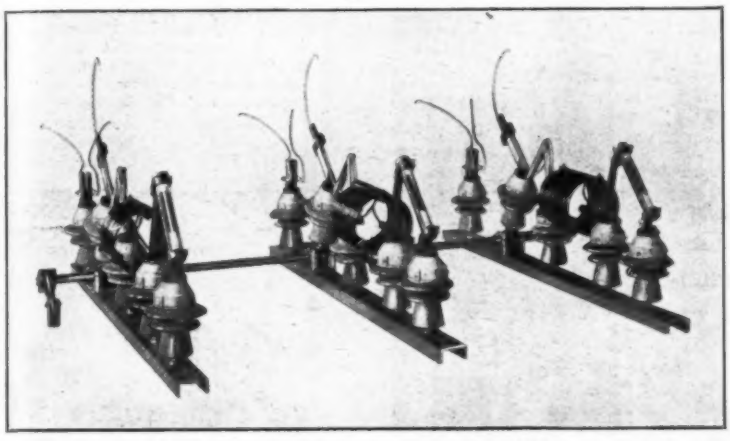


Fig. 126.—An "Electric Control" 22,000-V, three-phase, Pole-type Switch.

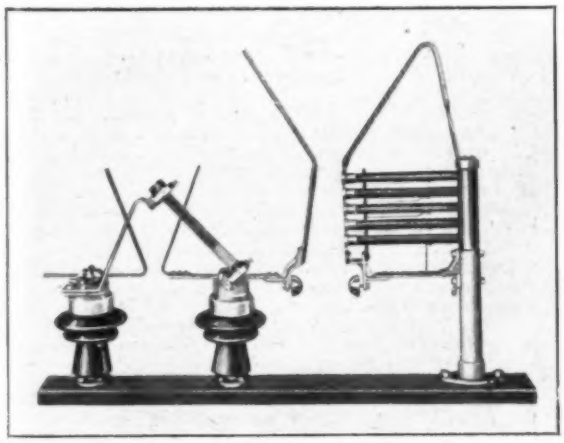


Fig. 127.—An "Electric Control" Graded-rod Arrester.

Typical of the company's motor control gear is the panel illustrated in fig. 128, which is a 100-h.p. machine tool controller. Starting and inching are effected by conveniently-situated push-buttons, while speed control by shunt regulation is obtained on the panel. Both poles are provided with overload trips fitted with adjustable time lags, and separation from the line is effected by a hand-operated isolating switch. This switch is so interlocked that if it is operated to shut down the motor the main circuit is always broken on the contactor equipment which is protected by powerful blow-out coils. When the inching button is pressed the motor armature is connected across the line in series with the whole of the starting resistance. The "start" button energises the automatic starter, and the motor runs up to speed automatically. The rate of acceleration and time in which the starting resistance is cut out are readily set by an adjustable timing device. During the period of acceleration the full field of the motor is maintained by contacts which open in the correct sequence when the full normal speed is reached, thereby inserting the required amount of field resistance as determined by the shunt regulator on the panel. Other control panels which are on view are a smaller machine controller and a lift controller. The latter gives fully automatic operation from the cage or the landings. The entry of a person into the lift operates a floor switch which immediately cuts out the landing controls. When a person has taken control of the lift it is impossible for anyone else to operate it.

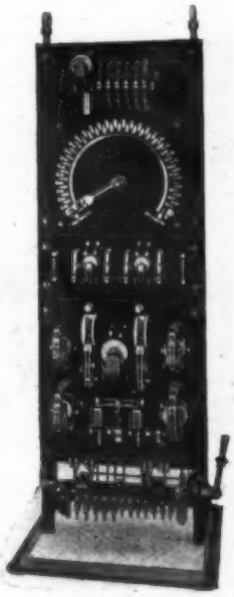


Fig. 128.—Machine-Tool Panel.

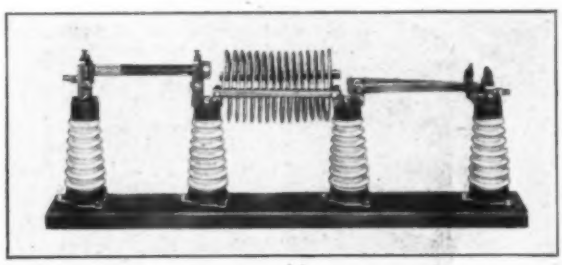


Fig. 129.—Combined Fuse, Choke Coil and Isolating Link.

The Sterling Telephone and Electric Co., Ltd.

(*Stand No.* 133, *Avenue* 15, *Bays* 11-13.)

The exhibits of this company are contained in a kind of showroom. The articles are arranged in showcases and about the room, as well as in a number of windows looking out into the passages about the stand. An interior view is given in fig. 130. A full range of wired and wireless telephone apparatus is exhibited, including central-battery, local-battery, long-distance, and domestic systems. One or two exchanges are shown, in addition to a large array of components and accessories. In one of the windows ironclad telephone equipment is displayed. This is designed for use in noisy surroundings, and throat transmitters are employed. The radio-telephony branch is well represented. Prominent among this class of apparatus is the Sterling "Threeflex" set, which is entirely self-contained, needing no external aerial or earth connections. Crystal, valve, and crystal-valve sets of all kinds

Fig. 130.—The Sterling Co.'s Stand (interior).

are shown, and, in addition, the company's "unit" system, by means of which quite elaborate sets can be built up gradually, is displayed and demonstrated. A particularly good show is made by the decorative receiving sets in Japanese lacquer and Oriental finishes. Loud speakers, both separate and incorporated in the receiving apparatus, are another feature of interest.

The Electric Heating Co.

(*Stand No.* 109, *Avenue* 14, *Bays* 5 *and* 6.)

This company, which is exhibiting in conjunction with the London Electric Firm, shows a number of domestic appli-

Fig. 131.—A Novel Boiling-ring and Boiler.

ances, including irons, bowl fires, &c. One of the most original exhibits is the boiling ring-boiler combination illustrated in fig. 131. This consists of a 1,500-W boiling ring mounted on a vessel which holds a gallon. Thus in addition to fulfilling the ordinary duties of a boiling ring, the appliance uses the heat which would otherwise be wasted for raising the temperature of the water in the vessel. The company claims that a gallon of water can be boiled in the vessel in three-quarters of an hour, while the boiling ring is in use for heating a further supply of water. The appliance is made of solid aluminium without joints, and it will not be damaged if the vessel is left dry.

A Large "Pul-syn-etic" Installation.

Amongst the many public services which contribute to the convenience of visitors to the British Empire Exhibition, mention must be made of the electric impulse clocks operating on the "Pul-syn-etic" system and installed by the makers, Messrs. Gent & Co., Ltd. The clocks are fixed in prominent positions in various parts of the Exhibition, and may be recognised by the unique "winged" design specially made and registered for the purpose of the Exhibition.

The time circuit on which the clocks operate, which involves over 2¼ miles of wiring, consists of ordinary 18-gauge electric light wire; it is stapled to walls, fixed in casings, run in tubes, and laid underground, and all the difficulties of wiring in modern works and factories have been met and surmounted.

The time transmitter driving all the "Pul-syn-etic" clocks, both those in public positions and those fixed on exhibition stands, can be seen just inside the Watt Gate of the Palace of Engi-

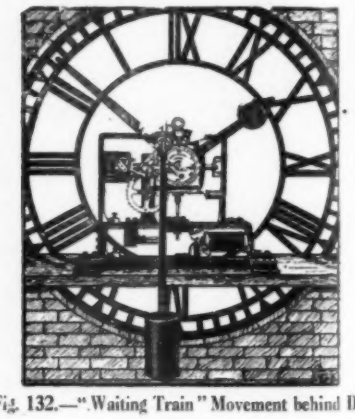


Fig. 132.—"Waiting Train" Movement behind Dial

neering and the energy required to operate the transmitter and impulse clocks is so small that Leclanché cells are used for the purpose. The transmitter sends electrical impulses every half minute round the complete circuit, and thereby advances the hands of all clocks by a corresponding degree.

The clocks range from small 12-inch diameter models to larger sizes 36 inches in diameter. There are also four turret clocks driven by "waiting-train" movements, fig. 132, in lieu of impulse movements to meet the requirement of large clocks having hands exposed to the elements, but for time-keeping they are controlled by the impulse transmitter. The "waiting-train" movements are of the same type as those driving the hands of the large clock on the Royal Liver Building in Liverpool, which is claimed to be the largest electric clock in the world, and has four 25-ft. faces.

Not the least important feature of the "Pul-syn-etic" system is that existing workmen's time recorders can be included in the time circuit by means of the patent "reflex" control fitting which ensures that the instruments keep exact time with the other clocks in the circuit and with each other throughout the establishment. Some of the "reflex" fittings can be seen operating on workmen's registers at the exhibit of the National Time Recorder Co., Ltd., in the Palace of Engineering, and the tabloid exhibit of industrial "Pul-syn-etic" impulse clocks is to be seen in the horological section of the watch, clock, and jewellery section in the Palace of Industry, as well as an entirely automatic programme of works "start and cease work"-signals known as "time discipline apparatus."

Many exhibitors' stands are equipped with "Pul-syn-etic" clocks. The clocks serving the general public in the Exhibition buildings and grounds are over 50 in number.

Venner Time Switches, Ltd.

(*Stand No.* 111, *Avenue* 14, *Bays* 5 *and* 6.)

This company's principal manufacture is well represented by a variety of time switches. There are about 40 different types, ranging from 0.1-A single-pole to 400-A triple-pole; these are all mechanically operated, and are entirely independent of the supply voltage, current, &c. The types exhibited cover all the usual requirements for switching on or off lighting, heat, and power, and include special apparatus for poultry farms, programme ringers for schools, factories,

and business houses, &c. One type exhibited is illustrated in fig. 133. This is the "Autonoff" switch for shop-window lighting, and, although of a cheap nature, does not consist merely of an alarm clock and tumbler switch—the usual arrangement employed for the purpose.

Apart from time switches the company also shows an accurate gauge for small parts which was extensively used during the war, and is still employed at Woolwich Arsenal

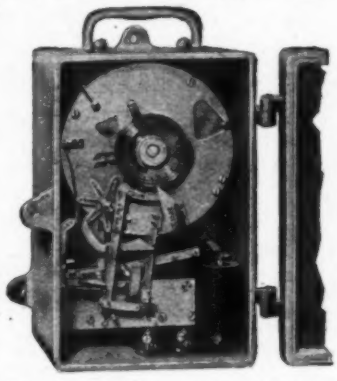


Fig. 133.—The Venner "Autonoff" Switch.

and elsewhere; the "Shotter" water meter, which gives exact and continuous readings at any remote point, enabling, for instance, the condensate at an electricity works to be recorded at the switchboard; an electric buoy light, time-switch controlled, such as is used, for example, by cable ships when buoying ends of defective cables; and a stop watch with a large scale permitting periods of time to be measured to within 0.1 of a second. There are also some samples of the firm's aluminium castings.

The Record Electrical Co., Ltd.

(*Avenue* 14, *Bay* 8.)

This company has a showcase in which are exhibited representative examples of its instruments. One new pattern is a moving-iron a.c. ammeter, for switchboard mounting, with a scale range of 330 deg. This is a counterpart of the firm's permanent-magnet "Cirscale" instrument; its accuracy is within B.E.S.A. first-grade limits and temperature, and frequency errors are negligible. The latest model ohmmeter and generator is shown. This embodies many improvements on previous types, and weighs only 6 lb.; it will measure

Fig. 134.—The Record Electrical Co.'s Exhibit.

resistances up to 100 megohms, and generates a current at 500 V. A complete range of moving-coil "Cirscale" instruments is included, these being from 2½ in. to 16 in. in diameter. Other items shown are portable testing apparatus, circuit breakers, and automatic battery switches. The usual type of sector scale instrument in which the scale length is equal to the dial diameter is also exhibited. A view of the case appears in fig. 134.

Messrs. Hadfields, Ltd.

(*Stand No.* 25, *Avenues* 6 *and* 7, *Bays* 15-18.)

This leading firm of steel manufacturers displays examples of its various types of steel in numerous forms. A group of four hydraulic cylinders capable of withstanding a pressure of 3.5 tons per sq. in. is an outstanding feature of the exhibit. In the railway and tramway trackwork section are specimens of railway crossings constructed of the Hadfield patent "Era" manganese steel rolled rails. The already considerable use and the growing demand from the railways for rolled rails and special trackwork built up from these has led Messrs. Hadfields to erect and equip a new electrically-driven 28-in. rolling mill, specially designed for the production of manganese steel rails up to their heaviest sections and 50 ft. in length, equipped also with the necessary appliances for their heat treatment. This works was described in our issue of December 1st, 1922 (p. 833). This mill is capable of rolling 1,500 tons of special or other steel ingots per week, weighing 1¼ tons apiece, down to billets as small as 2½ in. The three-phase motor with which the mill is driven is rated at 3,200 h.p., the current being supplied by the Sheffield Corporation.

A worn crossing is exhibited which was taken from the busiest tramway junction in Sheffield after about 12 years' wear, during which 13½ million cars passed over it, equivalent to an aggregate of 137 million tons of traffic. This crossing is made of "Era" cast manganese steel, and it is a significant fact that, prior to the introduction of the latter, the life of ordinary hard carbon steel crossings at the junction referred to was a few months. Other interesting features are tramway points of the special patented "Hadura" design; complete tramway wheels with cast steel centres and axles, tyres, bent rails, fishplates, and other products.

Other departments represented in the exhibit are colliery and mining work, stone and ore-crushing machinery, dredger work, and steel for steam turbines. In connection with the last, there is an exhibit of "Hecla/A.T.V." steel which is now being employed on a large scale for nozzles, diaphragms, and blading of steam turbines. The principal virtue of this is its ability to resist the corrosive and erosive action of high-temperature steam, particularly where the steam is generated from saline or impure water.

Messrs. J. H. Tucker & Co., Ltd.

(*Stand No.* 92, *Avenue* 13, *Bay* 8.)

This company has a very comprehensive display of tumbler switches of various patterns in a number of finishes. One of the principal types is the company's well-known quick-make-and-break switch which has a positive action to the full extent of the dolly movement. Another feature of the stand is a range of miniature accumulator switchboards specially designed, on the lines of the firm's standard boards, for small private installations. Another section comprises ironclad switches and fuses of several types for currents up to 100 A, and Home Office fuseboards in teak and iron cases. There are also examples of lampholders, including a quick-make-and-break pattern, and other electrical accessories.

Swiss Electric Transmission, Ltd.

(*Stand No.* C.10, *Avenues* 11 *and* 12, *Bays* 20 *and* 21.)

This company has a small exhibit consisting of high- and low-pressure transmission line equipment, including porcelain insulators, bushings, &c.

New Eccles Rubber Works, Ltd.

(*Stand No.* 149, *Avenue* 15, *Bay* 13.)

Ebonite in sheets and rods and in manufactured form is shown by this firm. In addition, articles in "Stabalite" insulating material, radio components, &c., are exhibited.

Ioco Rubber and Waterproofing Co., Ltd.

(*Avenues* 11 *and* 12, *Bays* 20 *and* 21.)

This firm's principal exhibit is paper insulation in various forms, insulating tapes, &c.

The Virtues of Sunlight.—At the recent conference of the British Commercial Gas Association, Dr. C. W. Saleeby laid stress on the use of water-power, electricity, and coal as they ought to be used, so that cities would not be obscured by a barrage of smoke that cut out sunlight, the best medicine, stimulant, and antiseptic ever known. It was being discovered that the impact of the sun on the skin was one of the most valuable foods that anyone could absorb; it directly affected the blood in a way that could not be done by any other means. He contrasted the smoke and soot of London with the clear air of New York, where no locomotive which produced smoke was allowed within forty miles of the city, and a sanitary regulation stated that no one should cause smoke. True sunlight was practically never allowed to reach London. The amount of smoke in the atmosphere was almost always such as to cut away the ultraviolet rays on which healing action depended. Light exalted the self-defending power of the blood and did what no drugs could do.

Swedish Electrical Imports.

The following figures, showing the values of the imports of electrical and allied goods into Sweden in 1923, are taken from the recently-published official trade returns. For purposes of comparison the figures for 1922 are given and notes of increases or decreases are made.

	1922. Kronor.	1923. Kronor.	Inc. or dec. Kronor.
Accumulators and parts thereof—unmounted cells—			
Total	18,000	82,000	+ 64,000
Denmark	1,000	12,000	+ 11,000
Germany	11,000	68,000	+ 57,000
United States	5,000	2,000	– 3,000
Accumulator plates—			
Total	401,000	665,000	+ 264,000
Denmark	4,000	42,000	+ 38,000
Germany	361,000	570,000	+ 209,000
Great Britain	26,000	27,000	+ 1,000
U.S.A.	9,000	23,000	+ 14,000
Cells and batteries, whole or part mounted—			
Total	217,000	404,000	+ 187,000
Denmark	61,000	140,000	+ 79,000
Germany	95,000	158,000	+ 63,000
Great Britain	6,000	14,000	+ 8,000
U.S.A.	46,000	78,000	+ 32,000
Boards for electrical instruments and apparatus, fitted—			
Total	93,000	150,000	+ 57,000
Denmark	16,000	17,000	+ 1,000
Germany	73,000	123,000	+ 50,000
Great Britain	3,000	4,000	+ 1,000
Special apparatus for electrical purposes:—			
Röntgen ray apparatus—			
Total	179,000	238,000	+ 59,000
Germany	140,000	200,000	+ 60,000
U.S.A.	9,000	21,000	+ 12,000
Wireless telegraph and telephone apparatus—			
Total	72,000	1,963,000	+1,891,000
Germany	65,000	198,000	+ 133,000
Great Britain	3,000	70,000	+ 67,000
U.S.A.	—	1,586,000	+1,586,000
Other special apparatus for electrical purposes—			
Total	1,500,000	1,500,000	—
Denmark	73,000	103,000	+ 30,000
Germany	749,000	949,000	+ 200,000
Great Britain	666,000	196,000	– 470,000
Switzerland	25,000	25,000	—
U.S.A.	69,000	180,000	+ 111,000
Galvanic cells—			
Total	761,000	1,223,000	+ 462,000
Denmark	122,000	431,000	+ 309,000
Germany	610,000	720,000	+ 110,000
Generators, motors, &c., weighing not more than 50 kilos each—			
Total	763,000	1,169,000	+ 406,000
Denmark	131,000	213,000	+ 82,000
Germany	382,000	635,000	+ 253,000
Great Britain	68,000	127,000	+ 59,000
U.S.A.	122,000	137,000	+ 15,000
Ditto, weighing more than 50 but less than 100 kilos—			
Total	143,000	184,000	+ 41,000
Germany	99,000	130,000	+ 31,000
U.S.A.	19,000	13,000	– 6,000
Ditto, weighing more than 100 but less than 500 kilos—			
Total	421,000	381,000	– 40,000
Denmark	21,000	32,000	+ 11,000
Germany	329,000	307,000	– 22,000
Ditto, weighing more than 500 but less than 3,000 kilos—			
Total	710,000	247,000	– 463,000
Denmark	7,000	45,000	+ 38,000
Germany	666,000	181,000	– 485,000
Great Britain	11,000	19,000	+ 8,000
Ditto, weighing more than 3,000 kilos—			
Total	248,000	415,000	+ 167,000
Denmark	—	11,000	+ 11,000
Germany	248,000	403,000	+ 155,000
Transformers, 100 to 500 kg.—			
Total	62,000	69,000	+ 7,000
Germany	59,000	54,000	– 5,000
U.S.A.	2,000	11,000	+ 9,000
Transformers over 3,000 kg.—			
Total	737,000	91,000	– 646,000
Germany	534,000	91,000	– 443,000
U.S.A.	203,000	—	– 203,000
Metal Filament Lamps—			
Total	3,444,000	3,679,000	+ 235,000
Denmark	152,000	463,000	+ 311,000
Germany	2,323,000	1,267,000	–1,056,000
Netherlands	751,000	1,420,000	+ 669,000
Belgium	5,000	132,000	+ 127,000
Insulating tubes, steel armoured—			
Total	68,000	59,000	– 9,000
Germany	68,000	56,000	– 12,000
Lamp sockets, with and without switches—			
Total	405,000	346,000	– 59,000
Germany	378,000	334,000	– 44,000
Insulating tubes, other kinds—			
Total	369,000	344,000	– 25,000
Germany	351,000	310,000	– 41,000
Carbon, not specially mentioned, manufactured for electrical purposes, weighing 3 kilos or more—			
Total	439,000	654,000	+ 215,000
Germany	383,000	470,000	+ 87,000
Carbon brushes—			
Total	70,000	73,000	+ 3,000
Germany	10,000	11,000	+ 1,000
Great Britain	57,000	55,000	– 2,000
Carbon: Other kinds—			
Total	545,000	639,000	+ 94,000
Germany	340,000	531,000	+ 191,000
Starting, regulating, and reduction resistances, controls, and other electric regulators—			
Total	278,000	288,000	+ 10,000
Germany	258,000	236,000	– 22,000
Bases for incandescent lamps—			
Total	336,000	678,000	+ 342,000
Germany	195,000	541,000	+ 346,000
Netherlands	136,000	134,000	– 2,000
Stators, rotors, current collectors, magnet coils, &c., weighing not more than 50 kilos.—			
Total	45,000	72,000	+ 27,000
Denmark	8,000	21,000	+ 13,000
Germany	31,000	34,000	+ 3,000
Current interrupters and reversers, oil brake switches, hand-operated—			
Total	53,000	37,000	– 16,000
Germany	47,000	31,000	– 16,000
Box switches—			
Total	525,000	498,000	– 27,000
Germany	491,000	463,000	– 28,000
Knife switches mounted on slate slabs—			
Total	223,000	208,000	– 15,000
Germany	108,000	124,000	+ 16,000
Other kinds—			
Total	122,000	169,000	+ 47,000
Germany	108,000	141,000	+ 33,000
Safety appliances, not specified—			
Total	756,000	862,000	+ 106,000
Germany	690,000	808,000	+ 118,000
Electric stoves for household use—			
Total	368,000	232,000	– 136,000
Denmark	16,000	31,000	+ 15,000
Germany	323,000	178,000	– 145,000
Electricity meters—			
Total	1,220,000	1,446,000	+ 226,000
Germany	1,176,000	1,360,000	+ 184,000
Netherlands	—	27,000	+ 27,000
Belgium	—	23,000	+ 23,000
Other electrical measuring instruments—			
Total	348,000	395,000	+ 47,000
Denmark	14,000	14,000	—
Germany	280,000	326,000	+ 46,000
Porcelain insulators, conduit pipes, &c.: Whites—			
Total	403,000	454,000	+ 51,000
Denmark	34,000	15,000	– 19,000
Germany	325,000	428,000	+ 103,000
Ditto, other kinds—			
Total	162,000	142,000	– 20,000
Germany	67,000	47,000	– 20,000
U.S.A.	79,000	79,000	—
Electric lighting fittings of brass, coated, varnished, and lacquered—			
Total	133,000	151,000	+ 18,000
Germany	114,000	126,000	+ 12,000
Cables and cords with sheaths of lead or other metal; maximum diameter 25 mm.—			
Total	586,000	520,000	– 66,000
Denmark	42,000	22,000	– 20,000
Germany	522,000	482,000	– 40,000
Ditto, of greater diameter—			
Total	1,832,000	460,000	–1,372,000
Denmark	31,000	21,000	– 10,000
Germany	1,327,000	427,000	– 900,000
Ditto, not specified			
Total	561,000	769,000	+ 208,000
Denmark	55,000	57,000	+ 2,000
Germany	419,000	563,000	+ 144,000
Netherlands	34,000	43,000	+ 9,000
Belgium	37,000	43,000	+ 6,000

(£1 = about 17 kr.)

Large Steam Turbo-Generators.

American Opinion and Suggestions.

A PAPER on the above subject, which raises important considerations, was to be read before the American Institute of Electrical Engineers on October 15th by Messrs. W. J. Foster, E. H. Freiburghouse, and M. A. Savage, all of the General Electric Co., of Schenectady. In some ways the paper may be considered, as was briefly indicated last week, as a statement of the results that have been obtained with the largest machines recently built by the American "low-temperature school" of turbo-alternator designers, and thus to represent a reply to the suggestion of the "high-temperature school" that, owing to mechanical difficulties, the largest machines cannot be built for low temperature rises. An abstract of the paper, in so far as it is of interest to users of turbine machinery, is as follows:—

The power companies that generate and distribute electricity in the largest amounts have continually asked for larger and larger steam turbines, with the result that 30,000-kW sets have become quite numerous. The design of the turbine and of the generator at every step to larger sizes involves distinct problems that, in nearly all cases, are worked out by two distinct groups of engineers, which are in continual competition as to which can produce the larger machine at any given speed—steam turbine or electric generator.

Installations of several of the largest steam turbine-driven generators built in America have been made during the past year. They are 6-pole, 62,500-kVA, 0.8 power factor, 1,200-r.p.m., self-ventilated unit sets, and the first of them was put into operation in the Hudson Avenue power house of the Brooklyn Edison Co. Some idea of the size of these machines is conveyed by the following weights:—Rotor 205,000 lb.; stator 205,000 lb.; shields, &c., 25,000 lb.; and the total, not including base, pedestals, or bearings 435,000 lb. There is some 41,250 lb. of copper in the machine; the stator contains 37.6 miles of insulated wire, and the rotor 4.5 miles. At the present moment 62,500-kVA, 14,000-volt, 60-cycle generators are being built to run at 1,800 r.p.m., and 60,000-kW, 11,000-volt, 25-cycle generators at 1,500 r.p.m.

Temperature and Methods of Determining It.

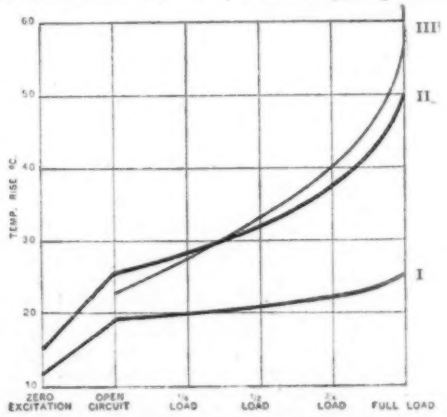
Searching tests have been made in the shops, as well as on generators in commercial service, to determine the:—

(1) Maximum observed temperature rise on the bare copper of the stator windings;

(2) Maximum observed temperature rise as commercially measured (between the upper and lower coils in a slot) by: (*a*) 20-in. long, ¼-in. wide resistance temperature detectors; (*b*) 10-in. long, ¼in. wide resistance temperature detectors; and (*c*) a thermo couple.

(3) Differences in temperature at different locations longitudinally in a slot of the commercially embedded detector.

More such tests have been made on the 35,300-kVA, 85 per cent. power factor (30,000-kW) generators of various voltages than on any other size, and the most recent test was on 13,200-volt machines, when, fortunately, a pair of them



Curve I=Temperature rise of air; Curve II=Maximum temperature rise of armature windings by r.t.d.; Curve III=Temperature rise of rotor windings by resistance.

Fig. 1.—Temperature Rise Curves of 62,000-kVA, 1,200-r.p.m., Turbo-Generator.

passed through the shops at the same time, and it was possible to run them at full load and zero power factor. Information gleaned from the data obtained indicates that:—

(i) On machines of from 12,000 to 14,000 volts the temperature of the bare copper is approximately 15 deg. higher than the temperature determined by the 20-in. long detector located between the top and bottom coils in commercial machines, when the latter is from 55 to 60 deg. above the temperature of ingoing air.

(ii) Temperatures determined by a resistance detector and thermo-couple on bare copper are approximately identical; temperatures determined by the 20-in. long detector, as located in commercial machines, is approximately the same as determined by a thermo-couple.

(iii) The temperatures at the half-way location in a slot are approximately 2 deg. lower than at the quarter way, which indicates a trifle better ventilation at the half-way position.

The actual temperature rises for the 13,200-volt generators, with full load current, were 48 deg. C., as determined by a 20-in. resistance temperature detector in a stator slot, and 72 deg. C. in the rotor winding, as determined by resistance when operating with leading current and, consequently, greater excitation than that required for 85 per cent. power factor at full load output.

The results of the tests made under actual load on the 62,500-kVA generator of the Brooklyn Edison Co. are also given. Fig. 1 shows the temperature rises attained under the different conditions of no excitation, normal excitation without load, and at partial loads and full load, with the voltage required by the system. It is to be noted that this generator has the remarkably low temperature rise of 50 deg. C. under full load.

Fire Protection.

It is particularly important that large totally-enclosed generators be provided with protection against fire. Differential relay protection should be provided in order that excitation may cease and the set be disconnected from the system in the case of a puncture of the insulation, but such protection is useful only in connection with dielectric failures. It sometimes happens that a fire starts on the surface of the insulation without any electrical failure of the insulation. The exact causes of such fires are not always known, but they are liable to occur under certain conditions, such as the accumulation of dirt consisting of carbonised and other highly-inflammable material, and are probably started by a spark resulting from some switching operation or sudden heavy short circuit on the line. Such surface fires are hardly known, except in connection with large totally-enclosed machines; it is possible in some cases to detect a fire by the presence of smoke in the air discharge pipe, in which case it is usually best to kill the excitation immediately, shut the set down, and make an examination. However, all large generators should be provided with equipment to put out fire, and it has become customary to equip machines with pipes at both ends in proximity to the end windings, having their outlets so placed as to direct steam, water, or whatever agent is employed, in the most effective manner for putting out the fire. Steam and water are the agents that have been generally employed, although carbon dioxide gas has been chosen in a few cases. The use of an inert gas, such as carbon dioxide, has a certain advantage over the use of steam or water, in that it causes no temporary or permanent injury to the insulation; furthermore, the operator who suspects a fire will not wait so long to persuade himself that action must be taken if it is a matter of injecting an inert gas, as he would to turn on steam or water. Undoubtedly, the system of ventilation now coming rapidly into vogue, *i.e.*, that of re-circulating the same air and carrying off the heat by water coolers, has a decided advantage in the matter of fighting fire, since the oxygen in the air becomes rapidly exhausted and the products of combustion serve as a fire extinguisher. Tests that have been made indicate that a 25 per cent. saturation of carbon dioxide is ample to put out a fire. This system of ventilation prevents the accumulation of dirt, &c., and thus does away with surface fires.

Operating Conditions.

The handling of the rotor by operators is of extreme importance. Probably everyone will concur in the statement that the ideal condition to maintain in large generator rotors is a constant temperature of such a magnitude as 90 or 100 deg. This is not possible, but efforts should be made to maintain a temperature that varies within as small a range as possible.

The distributed field winding assembled in numerous slots and secured against centrifugal force by metallic wedges in the slots and by metallic binding bands at the heads, is peculiarly susceptible to deterioration if the temperature within the winding changes frequently and through a wide range. To appreciate this, it is only necessary to consider the nature of the structure; there are three different materials, one of them a more or less intricate compound, that are subjected to the changing temperature, and each material has a temperature coefficient of its own quite different from those of the others. The temperature coefficient of the copper is the highest, and about one and one-half times that of the steel in which it is embedded, while it is approximately twice that of the insulation that is inter-

mediate between the copper and steel. To intensify these differences, the copper itself is always subjected to a much wider range in temperature than either the insulation or the rotor body proper, and to a quicker response to changing load. Common practice points to temperature rises in the copper of about 85 deg. C. above the cooling medium as the proper range to allow between the no-load starting and the full-load constant running conditions. By simple arithmetical applications of the formula for a change of volume, due to temperature coefficient, it is found that the length of the field conductor in a 10-ft. long slot for a quick 85-deg. change becomes ¼ in. greater than the length of the envelope of insulation (except as the insulation stretches to accommodate itself to the pulling action of the coil) and 1/12th in. greater than the slot itself, in which the insulated coil is embedded. Undoubtedly, improved methods of forming the insulation and of holding the winding against centrifugal force allow these movements to take place with very little deterioration, but it is greatly to be desired on the part of the operating people that the variations in temperature be prevented from exceeding 85 deg. C.

A condition of operation to be avoided is that where the rotor is allowed, if the turbine is shut down, to reach a temperature approximating that out-of-doors in temperate climates during the cold season. Undoubtedly cases have existed in the near past, and probably occur at the present time, in which the rotor temperature falls to 0 deg. C. after an overnight shutdown. If in such a case the turbine is started and loaded and (for reasons of personal comfort of operators) the station air is used, the cooling air temperature will soon reach something like 25 deg. C. Consequently, if for any reason an overload in kilowatts for a short period is desired, or an unusual demand for power factor correction arises, requiring the excitation amperage to be increased as much as 10 per cent. over that stamped on the nameplate, the rotor temperature may readily reach 135 deg. C. In such case the unequal expansion of the various materials of the rotor that may occur within a few hours undoubtedly exerts mechanical strains that come with tremendous force on the insulation, and must, when repeated often enough, result in disintegration.

It is, therefore, strongly recommended to all operators of large steam turbines that they make a study of how to maintain the best conditions in the matter of temperature change in the rotor windings. It is recommended that:—

1. Overloads in excitation be avoided.
2. Such arrangements of ventilation be adopted as will permit as little cooling of the rotor when at rest as possible, and on no occasion permit the entrance direct of outdoor air.
3. A practice be established of determining the temperature of the field winding at stated intervals by observing the voltage at the collector rings and comparing it with that obtained under the same load conditions when the generator was first put into service.
4. Insulation resistance be measured at the same stated intervals; and
5. If for any reason at any time the rotor at rest has become very cold, it should be run at low speed with sufficient excitation to bring its temperature up to about 75 deg. C. in about one-half hour before raising the speed to normal.

The Kramer Electronic Cell.

A "Self-Charging" Condenser.

In the second part of his presidential address to the Scientific Society of the Birmingham and Midland Institute, Mr. J. B. Kramer, M.I.E.E., M.R.I., of the G.E.C. Witton-Kramer Electric Tool & Hoist Works, explained the results of some six years' research work which he had been able to complete sufficiently to refer to it for the first time in public. Although he has not finished the work in its entirety, he has made the important discovery of a new and interesting principle in the generation of electrical energy. His discovery is an electronic cell, similar to a "voltaic couple," but in which the electrolyte is replaced by a radio-active material; it may also be described as a "self-charging" condenser.

In order to make himself clear, Mr. Kramer drew attention to the fundamental principle, bearing upon the generation of electrical energy, by means of which two plates of different metals, when brought into contact with each other and then suddenly separated, manifested an electrical state. He recalled the controversy concerning Volta's contact force, and pointed out that the purely chemical aspect gradually had to give way to the atomic aspect. With the knowledge of to-day, when the constitution of the atom was almost common knowledge, the real cause of the potential difference between the two metal plates could be explained. He had found that electrical energy could be transferred from one metal plate to another, not only by bringing them into contact with each other and then separating them, or by means of a suitable electrolyte between them, but even through an air gap between the two parallel plates at rest, that was, by the aid of a radio-active substance placed upon one of the plates—without any outside source of heat, friction, or electrical energy.

TABLE I (Volta Effects).

Material.	P.D. in volts.
Z_N (+)	1·089
P_B	0·879
F_E	0·497
C_U	0·351
C (−)	0

Individual Couples:—

$\frac{Z_N\ (+)}{C\ (-)}$ = 1·089 volts $\quad \frac{C_U\ (+)}{C\ (-)}$ = 0·351 volts

$\frac{F_E\ (+)}{C\ (-)}$ = 0·497 volts $\quad \frac{Z_N\ (+)}{C_U\ (-)}$ = 0·738 volts

The president demonstrated experimentally that electrical energy could thus be transferred from one metal to another, remarking that the discovery led to the consideration of a new stage in the generation of electricity. Ionisation of the air and gases by various rays and radiations formed another new link to further discoveries, and experiments on the ionisation of air by means of various radio-active substances between two insulated metal plates showed that it was most essential upon which kind of metal plate the radio-active preparation was put. In his first successful experiment the top plate was made of copper, and the bottom plate, upon which the radio-active layer was placed, was made of zinc; always keeping the radio-active material on the bottom plate, he obtained different results with each different pair of materials.

Table I gave the p.d. in volts of the Volta effect between a carbon and a metal plate; the carbon always showed a negative potential, and the other metal plates a positive potential, zinc giving the maximum result with carbon. The table also showed the various potential differences between various metal plates, their positive or negative polarity being dependent on which metal was used; for instance, copper was sometimes positive and sometimes negative, depending on which metal it was in contact with.

With regard to the most likely theory on which the electronic cell was based, Mr. Kramer maintained the hypothesis he laid before the Society in his last year's presidential address. It was difficult for him to see how continuous electronic emission could exist in material other than radio-active materials, except when the atoms of stable elements were bombarded with X-rays, or exposed to similar radiations, and he could not see that electrons would flow from the Zn atom to the C atom by mere contact, except perhaps as dissociated electrons. Contact alone should only distort the otherwise stable electronic state, for the time being, as was the case in frictional electricity; hence the temporary opposite potentials of the plates. A more likely theory was that of distortion, by which an electric state of a body was due to the distorted state of the atomic system of the atoms on the outermost surface of the body. In his last year's address, particulars of this theory were given. Ten points from facts observed showed how he had come to his conclusions:—

(1) The p.d. between two metal plates if separated from each other, even by the smallest air gap, seemed infinitesimal without making contact and then separating the plates.

(2) If the plates were brought into contact and released, the zinc atoms influenced and distorted the atomic system of the carbon plate, and *vice versa*; that state was lasting for a short while only, until the atomic system of both plates became normal or "stable" again—similar to what happened to amber when rubbed; rubbing was merely a more intimate contact than touching.

(3) It could not be denied that positive and negative electrons issued by means of the radio-active substance sandwiched between the two plates, and that that electronic emission persisted.

(4) As there was, however, no potential difference between plates separated by an air gap, the positive and negative electrons from a sandwiched radio-active layer could therefore neither be attracted nor repelled by the plates without external influence.

(5) The alpha and beta electrons bombarded in the first instance after their liberation the air molecules and gas atoms in the air gap, and thus distorted the atomic systems of those gas atoms, or quickly recombined and formed fresh atoms, possibly H or He atoms. At any rate, he held that only very few—possibly neither—of the expelled alpha and beta particles reached the top plate, but that their energy and the charges of their minute masses were spent either in collisions or in recombinations.

(6) What was then the resulting product of their collisions? Was it possible that a gamma ray, or similar stray ray, which

was a neutral ray, similar to the X-ray, was produced? If such was the case, this ray would reach the plates and cause a distortion or deformation of the atomic system of the zinc and carbon atoms, just as an X-ray would do when it hit a solid object and so rendered the one negatively and the other positively electric according to the respective tight or loose state in which the thirty zinc or six carbon electrons were coupled to their protons or nuclei.

(7) In his electronic cell, the zinc (with carbon opposed) would be the negative and the carbon the positive pole; that was opposite to the Volta (contact) effect.

(8) Two plates of the same element showed no p.d.; there would be, however, a slight p.d. between two plates of the same metal if one was at a higher temperature than the other, or even in the case of copper plates, if the composition of each copper plate was slightly different.

(9) The chief reason why he considered it possible that the gamma ray (a by-product of all electronic radiations) might be responsible for the deformation of the atomic system of the Zn and C was that the ultimate positive or negative state of the plates was not neutralised by the supposed jointly arriving alpha or beta electrons. The deflection indicating the p.d. was steady in each case, in spite of the alpha and beta radiations going on after the plates were charged, and there was no tendency to either attract or repel them. How could they be available, having either combined or spent their energy in producing the gamma ray? They seemed certainly not to influence the accumulated steady charge; therefore, what became of them when the steady p.d. had been reached??

(10) The gamma ray being an ether motion, could account for the electric state of the top and bottom plates acquiring the maximum p.d. with each different pair of plates; for instance, with a Zn and C couple, a gamma ray could only distort the electronic system in those atoms to the extent of about one volt, and less if the couples were composed of other metals. The quantity of electrical charge obtained in electronic couples depended therefore chiefly upon the area of the plates, which was equivalent to the number of surface atoms exposed to the gamma ray effect, however intense and continuous. His opinions were further confirmed by the observed p.d. of electronic couples composed of various kinds of metal plates. The p.d. seemed to be very similar to those stated in the Volta effect tables, and he had strong suspicions that the figures were congruous, but he had not quite finished all the tests.

Another new and interesting feature in the construction of electronic cells he discovered only four days previously, when in lieu of the air gap and the radio-active material on the carbon plate which he had shown, he got similar effects by using one of the many substances which were in themselves both radio-active and at the same time insulators or, at any rate, poor conductors. For instance, having a thick layer of monazite sand or r.a. ilmenite, or the like, on the carbon plate, with the Zn plate directly on top of the sand (which was closely sandwiched between the top and bottom plates) a steady scale deflection would result with the Zn as the negative and the C as the positive pole. There might be electrolytic action in that case; the p.d. in such a couple was approximately 1 volt, and the current for a small area cell was about 5×10^{-4} ampere.

The author exhibited a small electronic battery having a p.d. of 25 volts, and hoped at the next conversazione of the Society (January, 1925) to show his electronic balance worked by one of the new batteries, built for 100 volts. It was possible to short-circuit an electronic battery at will, as often as one wished, but after removing the dead short it would immediately produce again its full charge. In conclusion, Mr. Kramer said that he would not like to be connected with those experimenters who were so eager to "smash up the atom." He simply advocated harnessing the electrons which were already emitted by nature without artificial means from the large number of radio-active sands or other r.a. minerals. They should be satisfied for the present in trying to do their best to utilise those electrons first, and build up from a small beginning, if possible, suitable electronic generators which made use of that source of energy.

Exports and Imports of Electrical Goods and Machinery in September, 1924.

THE September foreign trade figures reproduced below from the official returns show increases in all totals. The most striking contribution to the increase of £87,013 in the export total was that of unenumerated electrical machinery, which was £70,619 up. Glow lamp exports were more than doubled, and substantial increases also occurred in the export of unenumerated electrical goods and apparatus, insulated wires and cables, batteries and accumulators, railway and tramway motors, and switchboards. All items in the telegraph and telephone sections showed decreases, the most serious being in the case of submarine cable, which is an item that fluctuates considerably. There were only two cases of decline in comparison with the September, 1923, figures—carbons and submarine cable.

With the exception of telegraph and telephone wires and cable (not submarine), there was a general increase in the imports. This was most noticeable in the case of telegraph and telephone apparatus, although the imports of unenumerated electrical goods and apparatus, and batteries and accumulators, were also considerably augmented.

In the re-export section, increases and decreases were fairly balanced; the main increases occurred in unenumerated electrical goods and apparatus, telegraph and telephone apparatus, and meters and instruments.

It is interesting to note that, so far as the exports and re-exports are concerned, the figures represent a return to the July levels; the imports are about £100,000 greater in value.

The increase of £2,169,782 in the exports total for the first nine months of the year was due principally to larger exports of unenumerated electrical machinery (£983,000), insulated wires and cables (£436,000), unenumerated electrical goods (£329,000), and telegraph and telephone cable (£248,000).

	Exports.			Imports.			Re-Exports.		
	Electrical exports for Sept., 1924.	Inc. or dec. as compared with Aug., 1924.	Inc. or dec. as compared with Sept., 1923.	Electrical imports for Sept., 1924.	Inc. or dec. as compared with Aug., 1924.	Inc. or dec. as compared with Sept., 1923.	Electrical re-exports for Sept., 1924.	Inc. or dec. as compared with Aug., 1924.	Inc. or dec. as compared with Sept., 1923.
Electrical goods and apparatus (unenumerated)	£171,519	+ £25,190	+ £8,346	£99,555	+ £19,789	+ £15,252	£6,764	+ £2,020	+ £3,197
Insulated wires and cables ...	223,336	+ 37,437	+ 44,837	43,690	+ 7,727	+ 8,457	6	— 392	— 163
Glow lamps	44,269	+ 25,693	+ 9,011	21,766	+ 6,619	+ 3,854	295	— 281	— 532
Arc lamps and parts	319	— 565	+ 63	801	+ 48	— 28	17	— 3	— 245
Batteries and accumulators ...	76,802	+ 20,498	+ 30,772	37,029	+ 13,567	+ 19,037	193	— 45	— 257
Meters and instruments ...	32,763	— 980	+ 4,259	19,270	+ 2,675	+ 12,577	1,620	+ 1,446	+ 533
Carbons	1,222	— 2,006	— 2,871	7,465	+ 3,910	— 1,311	46	— 79	— 7
Electrical Machinery—									
Electrical machinery (unenumerated)	230,590	+ 70,619	+ 92,975	88,084	+ 2,046	— 17,854	4,316	— 1,025	— 2,531
Railway and tramway motors	44,134	+ 15,873	+ 13,279	—	—	—	—	—	—
Other motors and generators ...	147,908	— 40,942	+ 31,312	—	—	—	—	—	—
Switchboards (not telegraph or telephone)	10,897	+ 6,877	+ 1,658	31	+ 25	+ 31	38	+ 31	— 10
Telegraph and Telephone Cable and Material—									
Telegraph and telephone wires and cable (not submarine)	96,379	— 15,796	+ 33,017	12,623	— 1,387	+ 9,200	1,104	+ 844	+ 82
Submarine telegraph and telephone cable	3,550	— 16,634	— 42,673	—	—	—	—	—	—
Telegraph and telephone instruments and apparatus ...	191,623	— 38,251	+ 84,066	86,165	+ 31,883	+ 44,098	5,834	+ 2,182	+ 3,555
Totals...	£1,275,311	+ £87,013	+£308,051	£411,479	+ £86,902	+ £93,313	£20,233	+£4,698	+ £4,022
Increase or decrease for the nine months ended September, 1924		Exports. + £2,169,782			Imports. + £534,537			Re-exports. + £31,921	

Electricity Supply in East and Mid-Lothian.

Inauguration of Second Part of Scheme.

IT was in February last that the first district, comprising Monktonhall and Musselburgh, of the Lothians Electric Power Co.'s 500 square-mile area in the Counties of East and Mid-Lothian was provided with electricity, the supply being derived from the Westbank generating station* of the Edinburgh Corporation at Portobello.

The incoming supply is received at the company's sub-station at Monktonhall at a pressure of 33,000 volts, being there transformed to 11,000 volts and transmitted at that pressure to the Musselburgh Electric Light & Traction Co., which again transforms it and supplies the tramways and distributes at low pressure in the neighbourhood.

The second section of the scheme, which was commissioned on September 19th, 1924, is primarily fed from a 33,000-volt sub-station at Tranent, which receives a supply at that pressure from Portobello, and after transformation to 10,600 volts feeds sub-stations at Haddington, Preston, and Longniddry, which re-distribute electricity at 400 volts for power and at 230 volts for lighting in these towns, whilst Tranent, Prestonpans, Port Seton, and Cockenzie are accommodated by transformer kiosks receiving supplies at 3,000 volts and delivering at 400 and 230 volts.

A number of large power users have already applied for connection to the company's system, and in such cases the power is supplied at 10,600 volts to sub-stations erected on the consumers' premises. To accommodate farmers and others whose demand is smaller, but whose property is reasonably near to the transmission lines, the company fixes a transformer to a pole on the near-by 10,600-volt line and from it leads away a low-pressure supply to the premises requiring it.

The next section to be operated comprises the districts of Bonnyrigg, Lasswade, Loanhead, Glencorse, and Penicuik, including also a bulk supply to the Dalkeith Electric Supply Co. The work is well forward, and unless unforeseen delay occurs it is anticipated that supplies will be available within a week or so.

Services are being laid daily as fast as possible; the strict rotation in which business has to be handled makes it appear to the uninitiated that progress is not rapid, but their turn will come, and the approaching winter will see them enjoying the full advantage of electrical equipment. The Lothians Electric Power Co.'s distribution system is of unusual interest as being one of the first in the United Kingdom to be fed at a pressure of 33,000 volts, 3-phase, 50 periods, and considering that actual work was commenced less than twelve months ago, it is quite an accomplishment to have most of the important towns ready to receive the supply.

The National Electric Construction Co., Ltd., is the sole contracting firm responsible for the company's buildings, equipment, overhead transmission lines, pole gear, &c., the lines generally being erected in the form of a triangle, and at road crossings in duplicate and bound together. The underground cables were also laid and jointed by the contractors, and under their direction the large sub-stations at Monktonhall and Tranent were erected by Messrs. J. Angus & Sons, of Edinburgh, who also have the contract for the one to be built at Fordel. The sub-stations at Haddington, Preston, Lasswade and Longniddry, were built by Mr. R. Baillie, of Pencaitland, and Messrs. James Tait & Co., of Penicuik, were responsible to the National Electric Construction Co. for those at Loanhead and Penicuik, the architect concerned in all instances being Mr. H. O. Tarbolton, of Edinburgh.

British Insulated & Helsby paper insulated cables are used throughout the area, extra-high-pressure cables being wire armoured and low-pressure ones steel staped. Messrs. Ferguson & Pailin, Ltd., secured the contract for the sub-station switchgear which comprises, *inter alia*, four 33,000-volt switches in each main sub-station, of the sheet-steel cubicle type measuring 27 ft. long, 15 ft. 6 in. high, 7 ft. 6 in. deep. The 11,000-volt switchgear is of the draw-out truck type, while the main transformers are by the Brush Electrical Engineering Co.

The company, of which Mr. H. C. Babb, A.M.I.E.E., A.M.Inst.T., is the general manager, is no doubt fulfilling a public service which has long been needed.

*ELECTRICAL REVIEW, July 13th, 1923.

Published Specifications.

Compiled expressly for this journal by Patent Agents.
The name of the applicant's patent agent, if any, will be found on the printed specification.
The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

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1,840. "Sparking plugs for explosion motors." D. Zimmermann. January 23rd, 1924. (222,368.)

5,022. "Plugs for electric wall sockets and lamp sockets or the like." F. E. Shimwell and D. A. Mackay. February 27th, 1924. (222,379.)

7,742. "Automatic advance and retard ignition devices for magneto-electric machines." British Thomson-Houston Co., Ltd., A. P. Young, and A. G. Salisbury. March 26th, 1924. (222,402.)

7,854. "Telegraphy." Telefunken Ges. fur Drahtlose Telegraphie. April 12th, 1923. (214,226.)

8,918. "Apparatus for the recuperative braking of direct-current series motors, more especially for railway work." Akt. Ges. Brown, Boveri et Cie. July 16th, 1923. (219,281.)

9,414. "Electric motor control systems." Metropolitan-Vickers Electrical Co., Ltd. April 16th, 1923. (214,618.)

9,442. "Illuminated advertising and the like signs." H. H. Berry and C. A. Painton. April 21st, 1924. (222,409.)

10,420. "Electric corrective or modifying circuits for use with apparatus for reproducing sound." A. F. Sykes. June 28th, 1923. (Divided application on 220, 420. Addition to 160,223.) (222,413.)

12,932. "Apparatus for the electric measurement of the consumption of liquid fuel with respect to speed of motors, vehicles, or the like." F. Banneitz. May 25th, 1923. (216,536.)

17,711. "Cable telegraphy." Western Union Telegraph Co. October 23rd, 1922. (Divided application on 205,783.) (219,696.)

21,178. "Electrodynamic transmission systems." Sperry Development Co. May 5th, 1922. (Divided application on 11,238/23.) (221,590.)